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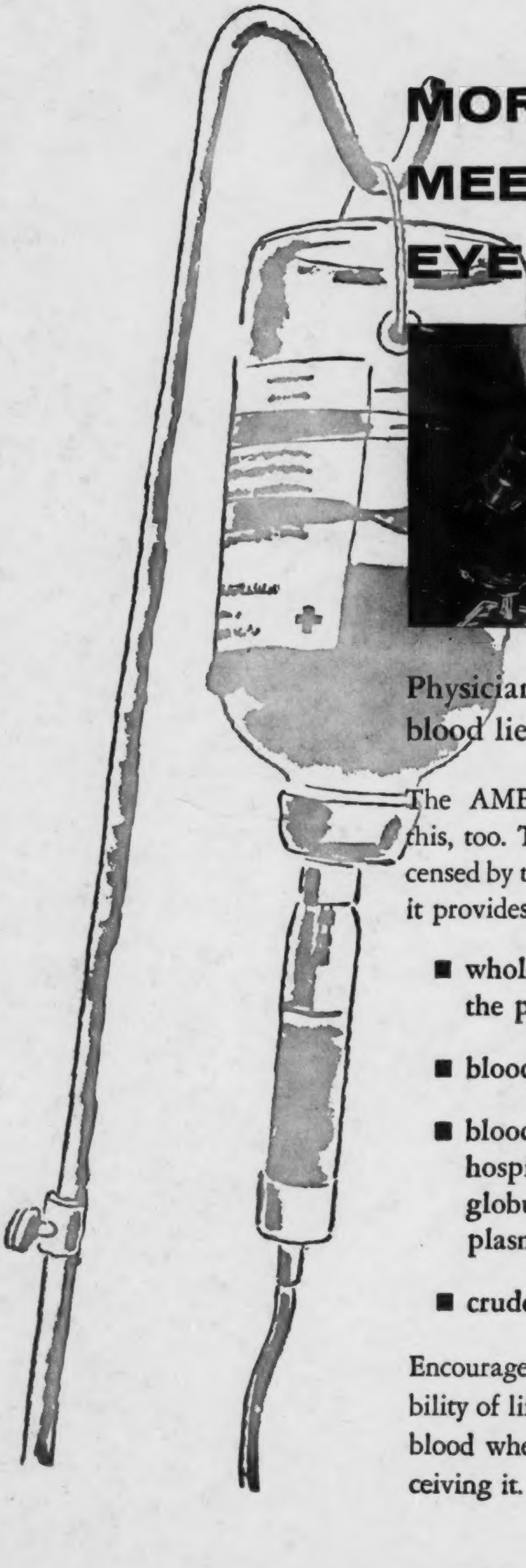
TABLE OF CONTENTS ON PAGE 2

Vol. 47 **APRIL, 1961** **No. 4**



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CONTENTS FOR APRIL, 1961

American Journal of Orthodontics

Original Articles

President's Address, Southern Society of Orthodontists. M. Duke Edwards, D.D.S., M.S., F.I.C.D., Montgomery, Ala. 241

The Problem of the Rotated Maxillary First Permanent Molar. Frank F. Lamons, D.D.S., Atlanta, Ga., and Charles W. Holmes, III, D.D.S., Sarasota, Fla. 246

The Positive Translucency: A Substitute for the Cephalometric Tracing and a Medium for Dynamic Serial Evaluation. Raymond C. Thurow, D.D.S., Madison, Wis. 273

Variations of the Begg Technique. Robert C. Flowers, D.D.S., Reading, Pa. 286

Editorial

To Amend Dental Hygienist Bill 308

Department of Orthodontic Abstracts and Reviews

Orthodontic Abstracts and Reviews 310

News and Notes

News and Notes 313

Officers of Orthodontic Societies

Officers of Orthodontic Societies 320

(Editorial and Business Communications on inside back cover)

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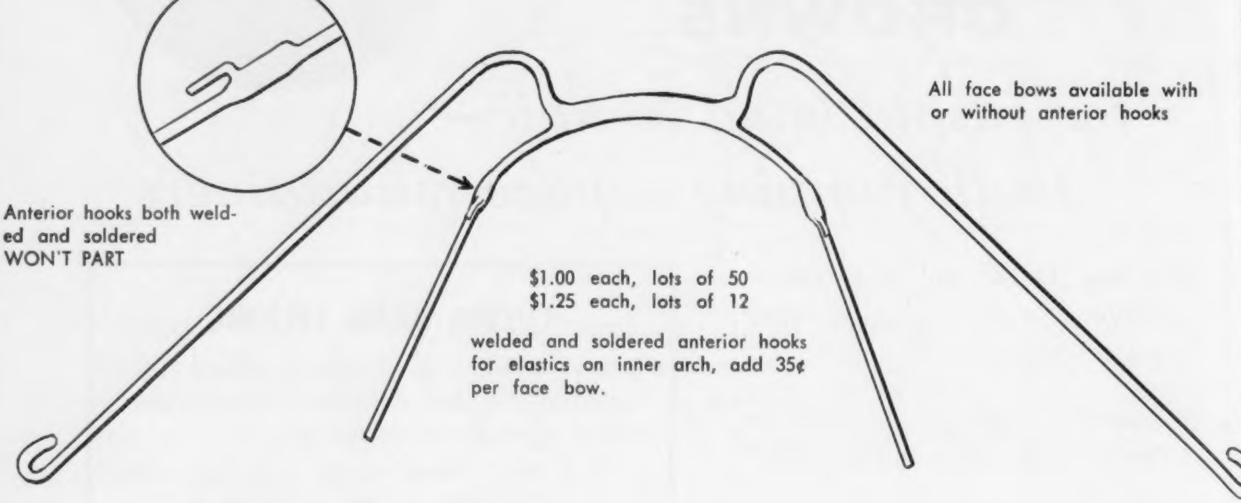

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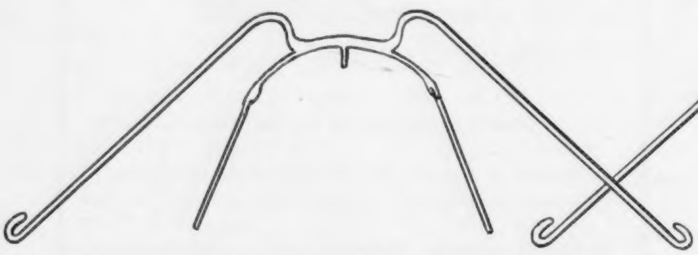

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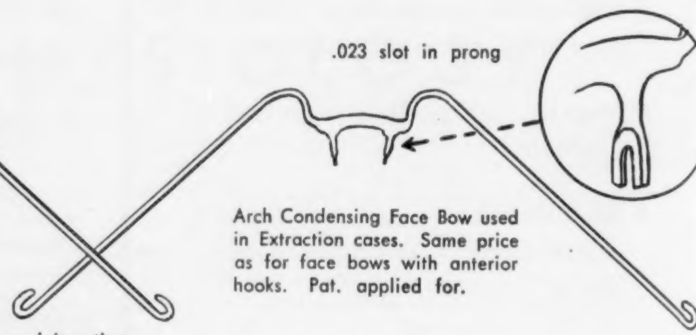

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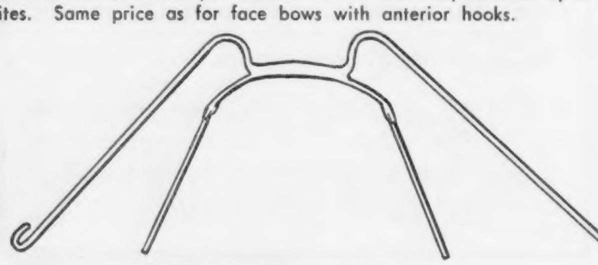

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FACE BOWS WITH WELDED AND SOLDERED ANTERIOR HOOKS
.044 inner arch—.060 outer arms

44AH	.044 inner arch.
45AH & CS	.044 inner arch with center spur.
46LA Left 47LA Right	.044 inner arch—one outer arm much longer. Longer arm is power side. No movement on short arm side.
48SLA Left 49SLA Right	.044 inner arch—one outer arm is 1/4" shorter. Longer arm extended for power action. Most useful for average case, where retraction is necessary on both buccal segments, but a little more on one side.
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51SE & CS	.044 inner arch same as above but with center spur.

PLAIN FACE BOWS—NO ANTERIOR HOOKS
.050 inner arch—.060 outer arms

150P	.050 inner arch.
151CS	.050 inner arch with center spur.
152LA	.050 inner arch—one outer arm much longer. Longer arm is power side. No movement on short arm side.
153SLA	.050 inner arch—one outer arm is 1/4" shorter. Longer arm extended for power action. Most useful for average case, where retraction is necessary on both buccal segments, but a little more necessary on one side.
154SE	.050 inner arch with ends of both outer .065 arms straight and one inch longer.
155SE & CS	.050 inner arch same as above but with center spur.

FACE BOWS WITH WELDED AND SOLDERED ANTERIOR HOOKS
.050 inner arch—.060 outer arms

250AH	.050 inner arch.
251AH & CS	.050 inner arch with center spur.
252LA Left 253LA Right	.050 inner arch—one outer arm much longer. Longer arm is power side. No movement on short side.
254SLA Left 255SLA Right	.050 inner arch—one outer arm is 1/4" shorter. Longer arm extended for power action. Most useful for average case, where retraction is necessary on both buccal segments, but a little more on one side.
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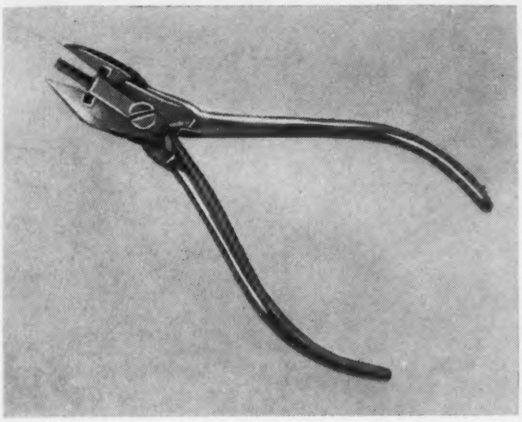

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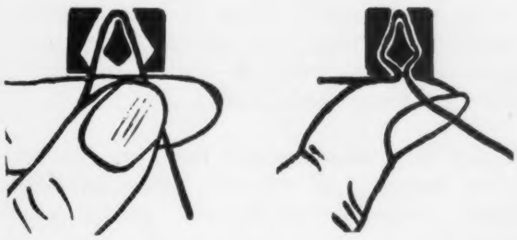

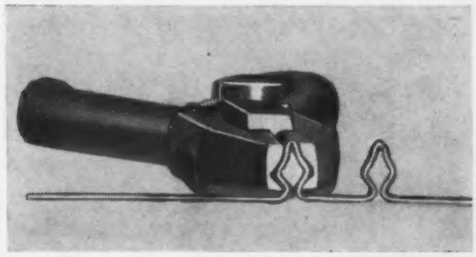

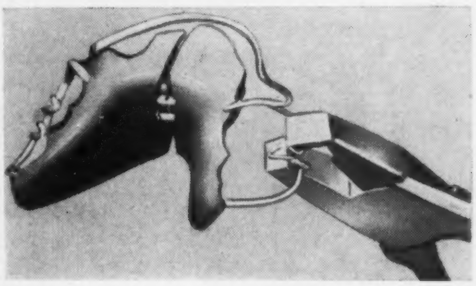

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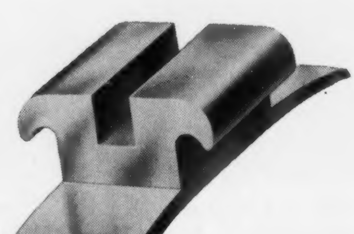

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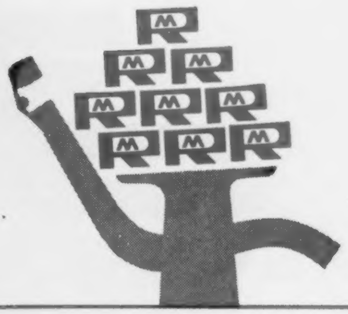

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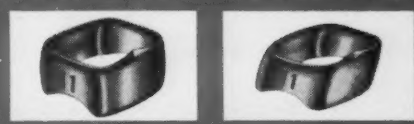

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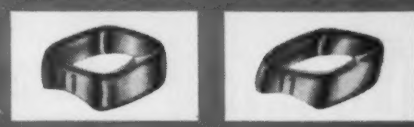

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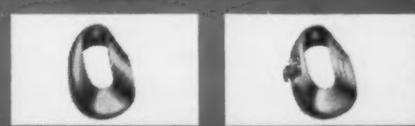

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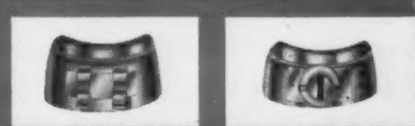

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VOL. 47 APRIL, 1961 No. 4

Original Articles

PRESIDENT'S ADDRESS, SOUTHERN SOCIETY OF ORTHODONTISTS

M. DUKE EDWARDS, D.D.S., M.S., F.I.C.D., MONTGOMERY, ALA.

THAT spring day in 1938 seems a long time ago this June of 1960. That was the day when I sat on George Moore's porch on Treasure Island in St. Petersburg, Florida, and first discussed the possibility of my studying orthodontics under his guidance at the University of Michigan. Little did I dream then that some day it would be my great privilege to serve as president of the Southern Society. It was my very good fortune to receive training under George and Chuck Waldo, both of whom have passed on at an early age. I would be remiss if I did not publicly acknowledge my gratitude to both of these fine teachers and leaders, as well as the Kellogg Foundation and the University of Michigan for that opportunity. It is with pride and humility that I stand here, Frank Lamons and Olin Kirkland, and thank you both for your love, kindness, encouragement, never-ceasing optimism, devotion to mankind and your profession, and for the part both of you played in my coming to Alabama twenty years ago this month. May I also add that Frank inspired me to be an orthodontist and guided me in every way possible. To my wife, Jeanne, go my sincere thanks for all her help, especially during the years I served as secretary. To my office manager, Mrs. Helms, who has been with me twenty years, goes grateful appreciation of her many services. I must not overlook my mother, for her faith and her prayers.

I will admit that becoming president of the Southern Society was not one of my ambitions, but I must also confess that being president of the Southern has indeed been one of the greatest compliments and achievements of my professional life. Perhaps I never would have had this honor if my ambitions

Presented at the thirty-ninth annual meeting of the Southern Society of Orthodontists, Grand Hotel, Point Clear, Alabama, June 26 to 30, 1960.

had been directed in that channel, but again I am grateful for the opportunity to serve our Society for the past ten years, all of which has led, step by step, to the presidency.

Our Southern Society has been a leading component of the American Association of Orthodontists for many years. We have produced outstanding leaders, and we shall continue to produce great men, men of vision and with a heart for mankind, men like Howard, Oliver, Gorman, Johnson, Kelsey, Hawley, Hale, McFall, Crozat, Gore, Broussard, and Bowyer, to name only a few, New philosophies, new theories, and workable ideas have come from our men. We are respected by the other groups, and we are noted for our cordial fellowship. Let us continue to command this respect and to maintain our proper place in our organization. Much of this attainment is due to those great leaders who have gone before us. Let none of us forget this, and let us always be grateful for this heritage.

Let us in the Southern Society decide at this meeting to dedicate ourselves, as orthodontists, to improve in the following fields:

1. To be better orthodontists in 1960 and 1961.
2. To have a general rule not to start a new case unless the patient is to remain in our care long enough to show a great amount of improvement.
3. To follow the Code of Ethics of the American Association of Orthodontists in handling transfer patients.
4. To constantly strive to say a good word about our fellow practitioners.
5. To practice the Golden Rule.

I would like to acknowledge the contributions made during the year by our faithful and capable secretary, Bill Oliver. He has made himself available at all times and has more than lived up to all expected of him. No president ever wished for a better Local Arrangements chairman and co-chairman than Charles Crook and Willis Michaels. My sincere thanks also go to the chairmen of the various committees—Jim and Willis Brown, Wendell Taylor, Charles Fontaine, and Willard Farmer. I would be remiss if I did not mention the inspiration of Alabama's beloved retired member, E. W. Patton of Birmingham, who is Honorary Local Arrangements Chairman. There are many others who have also worked and will be working to the last vote of adjournment that all of us might enjoy our meeting here at Point Clear. My thanks to each and all of them.

Many thanks go to Past-President Payne and his workers for their help and to Vice-President Wilson and President-Elect Charles Harrison for all their assistance in coordinating this meeting. I am grateful for the privilege and opportunity to know and work with one of our respected leaders, Oren Oliver. And, like the rest of you, I am always touched and inspired when I see Uncle Jake Gorman walk down that receiving line more than once, shaking hands with the men and kissing the ladies, to show love and appreciation for his fellow orthodontists. My gratitude also goes to our program chairman, Prescott Smith, and his able helpers, Hal Terry and Ed Baker. Press is a "worker," and he always gets things done. As for Walter McFall, I shall

never be able to express my heartfelt thanks to him for his kind words and encouragement. I personally want to thank Bodine Higley, past-president of the American Board of Orthodontists, and Frank Bowyer, who is a member of the Board, for appearing on our program in the interest of the A. O. B. Let me urge all members, especially the younger men, to make their plans to become certified by the American Board. Let me also thank William Humphrey, president of the American Association of Orthodontists, for coming and bringing us a message from our parent organization. My deep and sincere appreciation to our essayists—Robert Moyers, Frank Lamons, and Nat Gaston—for coming and giving of their time and talent. Their coming has helped make our meeting a success.

The Qualifying Committee is a new committee. These men have the terrific responsibility of coordinating orthodontic education requirements as they relate to Association membership. This committee is composed of Harvey Payne, John Atkinson, and Frank Bowyer (chairman). Qualification for membership in our organization has been going through a tremendous change for several years. There are still many important problems to be worked out. May we all be patient with this committee as they struggle with the solutions to these problems.

For the past several years in the Southern Society we have conducted an introduction ceremony for our new members. It is my feeling that this should continue to be a part of our program. In fact, I feel that the new members should not only be welcomed into our Society but should be made to realize that they, too, have obligations as well as a Code of Ethics to live up to.

In every speech, talk, or sermon, the well-known five-letter word "money" seems to find the opportunity to appear. There is an old Chinese proverb to the effect that one generation makes it and the next generation spends it. Specifically, I am referring to our cash reserve which has been accumulating for a number of years. To my knowledge, there has evolved no immediate worthwhile project for which to use this money. Let us in the near future begin thinking along the line of putting some of this cash reserve to work to justify further our existence as a health organization. I recommend that the Executive Council appoint a committee to study this subject further and report back to the Executive Council next year.

The *S.S.O. Newsletter* is one of the attractive features of our Society. Each year we receive a great deal of favorable publicity from it. The spotlighting of one of our members in each issue is a very popular feature. Soon after this feature was started, one member said that we would soon run out of men to "spotlight." To date, the Spotlight has been running almost ten years and we have plenty of qualified candidates still to be featured. Each year new and different leaders are developing. It is my hope that our *Newsletter* will continue in its present attractive form, periodically bringing us up to date on information and news of our fellow members.

The world in which we live used to be tremendous in scope, but today one feels that space and distance are no problem. It is more commonplace to speak of having breakfast in New York, lunch in Paris, and dinner in the Far East

today than it was for our forefathers to talk of traveling from one state to another. Who knows what the future holds? Our recent A. A. O. meeting in Washington was a most enjoyable affair in which we shared technical knowledge with our foreign friends. They, in turn, shared their knowledge and talents with us. It was a wonderful opportunity for us to create friends and build good will abroad. Our opportunities in the Southern Society are unlimited, and it would be well for us to broaden our scope. It might be advisable for us to consider having a speaker from another country at least every few years.

Many of us feel that everybody and everything is over organized, even to the extent that we have little time to fulfill the intent and purpose of the organization. It is my feeling, however, that we as orthodontists should get together in study clubs to exchange ideas and knowledge so that we may better serve our community. I should, however, hasten to add that the clubs should limit their activities to the purpose for which they were organized and not venture into other fields of endeavor.

It is also my feeling that each sectional society should have a more active and influential liaison with the graduate and undergradute departments of our teaching institutions. We have been too complacent, too reticent to voice our thoughts and our opinions. Perhaps we have been too willing to "let George do it." Consequently, we sit back and criticize after the professional educators set up the program, rather than sitting down with them and working out a more suitable one. Our future may rise or fall by the lack of interest in this important field. It is my recommendation that the Education Committee of the Southern Society establish a more active liaison with our teaching institutions and present an annual report to the Executive Council on the graduate and undergraduate training in the dental colleges, as well as an up-to-date report on the status of the associateship training program in our area.

We as orthodontists should continue to be active in the American Dental Association in all of its activities. The rules and regulations governing specialists are constantly being discussed, and plans are always in the making for changes. We must continually be alert.

Let me not forget Jim Pope, the convention manager of the Grand Hotel, for his kindness and advice. A special word of thanks goes to his secretaries, Mrs. Mannich and Mrs. Elliott, for their understanding and the tact with which they so earnestly tried to please those who did and those who did not get a room in the truly "Grand" Hotel. The Convention could not have been held without these two fine people, as well as all the others who assisted them.

The thirty-ninth meeting of the Southern Society is being held in June this year, as this seemed the most desirable time for the particular activities and attractions of Point Clear. It was originally thought that since only eight months have passed since our last Southern meeting, and only two months since the A. A. O. meeting in Washington, we could expect a relatively small attendance. We could not have been more wrong. We have had an unusually large request for reservations—from both members and guests. The Grand Hotel is a truly wonderful place to hold a meeting, but many of you know it

is small and many have to stay in nearby motels. This has been regretted by your President and the hotel management. Some of you may not be too happy, I realize, but all of you have been understanding and considerate. Let us all live up to our well-known reputation for "Southern hospitality." All of us who are fortunate enough to have a room in the hotel or cottages should open our doors to those who have to stay elsewhere. They should truly feel welcome and at home throughout the hotel. Let there not be a stranger among us.

Let us all remember that practicing orthodontics and serving mankind is not a given right, but a privilege. We must remember that the position we hold today has not come about accidentally, but that it has come gradually, by toil, tears, and sweat. Our heritage is a proud one. Many times it is said, "The orthodontists of today are better trained and know more than they did years ago." This statement may well be true, but let us hope that the next generation will be able to say the same thing. May we be proud and thankful that our profession has made progress, not smug and deceitful, but with the hope and prayer that our profession will continue to grow in knowledge and grace. Remember, we of today will tomorrow be those of yesteryear. Our heritage is a proud and noble one; let all of us dedicate ourselves to the task of passing on this heritage a little better than it has come to us. Then tomorrow it can be said, "The orthodontic profession today knows more, is better trained, and serves mankind better than it did yesterday."

234 South Hull St.

THE PROBLEM OF THE ROTATED MAXILLARY FIRST PERMANENT MOLAR

FRANK F. LAMONS, D.D.S.,* ATLANTA, GA., AND
CHARLES W. HOLMES, III, D.D.S., SARASOTA, FLA.

MOLAR relationships (upper to lower) have been a matter of major concern to orthodontists since the advent of Angle's classification of malocclusion in 1899.[1] While Angle did not indicate at that time the importance of molar relationships, the mesiodistal relationships of the teeth were discussed and this formed the basis of his later development of the concept of molar relationship, that is, the mesiobuccal cusp of the upper first molar occluding in the buccal groove of the lower, as the *key to occlusion*.[2]

The universal acceptance of Angle's classification focused attention on molar relationships, and orthodontic treatment has developed around the concept that the establishment of normal molar relationship is basic to success. The maxillary first permanent molar has been given a place of greater importance than any of the other teeth in both the diagnosis and the treatment of malocclusions.

The position of the maxillary first permanent molar has been studied from several viewpoints. Three are significant to our discussion and, although they are somewhat interrelated, they can be separated for clarity of discussion. They are (1) relation to or position in the maxilla,[3, 4] (2) anteroposterior axial inclination,[5, 6] and (3) approximating relationship to the adjacent teeth or, as it is usually called, "rotation." In this presentation, we are particularly concerned with the third area of study—rotation. Because of their interrelation, however, the other two fields must be discussed briefly.

Relation to or Position in the Maxilla.—Angle contended that the upper first permanent molar, erupting as it does back of all the deciduous teeth, always erupted in normal position in the maxillae. He stated: "Before the first molar erupts, it is preceded by the complete denture of the child which has developed normally under the most favorable conditions, for foods and habits of the child have been simple and normal, with practically no pathological conditions sufficiently grave to prevent nature from carrying out her plan of the normal building of the denture. So, the deciduous teeth *almost always* [italics ours] erupt into

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ideal normal occlusion [italics ours] and the child denture is not only perfect in form, in part and in whole, but *in location with the rest of the face and head* [italics ours], so that there is beauty and harmony and the highest efficiency." Angle continues: "So when the first molars (upper) erupt, they do so under the most favorable conditions, unhampered by predecessors or by those teeth anterior or posterior to them, the jaws having been lengthened for years for their coming and instead of being in any way hindered in their eruption, they are, on the contrary, *guided into and guarded in position* [italics ours] by the beautifully normally built child denture anterior to them."[3]

Angle established here the importance of this maxillary first permanent molar as the key tooth because of what he considered its constant or normal position in the arch and because the positions of all other teeth also of the lower arch are related to it.

It is interesting to note, in the discussions which followed the presentation of Angle's paper in 1905, that several of those present disagreed sharply with him on two points: (1) that the deciduous denture is always normal and (2) that the maxillary first permanent molar does not drift mesially. Some later writers have concurred with Angle on the constancy of position of this tooth, but most investigators who have seriously studied the question have disagreed with Angle's theory.

In 1927 Brash[7] stated that the first permanent molar could not be considered fixed, in any sense, as a basis from which to measure or superimpose alveolar arches. As is true of any other point in the jaw, its position is only relative. Thus, we have here one beginning point from which to study the true nature of any condition of malocclusion.

Atkinson[14] speaking of the "key ridge," has given us perhaps, the clearest picture of the position of the first permanent molar in the maxilla. He states: "There is a definite relation of the buccal teeth to the key ridge all during life. The ridge is present at birth and remains in evidence even though all the teeth are lost. The primary molars begin developing posterior to the key ridge. When the first molar of the primary set erupts, the second primary molar and the first permanent molar crypt are distal to this ridge of bone; but as the child becomes older the buccal teeth occupy a more forward position, the key ridge remaining constant in its relation to the skull."

Atkinson further states: "At the age of 3, the primary set of teeth are in their most perfect stage of development. Before spacing or root resorption begins, the mesiobuccal root of the second deciduous, or primary, molar is directly under the key ridge.

"As the facial bones continue to grow, the relation of the buccal teeth to this strong ridge of bone changes; the permanent molars slowly approach the key ridge until, at the age of 18, the roots of the first permanent molar wedge between the buccal and lingual walls of the maxillary bone and occupy a position in which the mesiobuccal root is directly under the key ridge. When the first permanent molar is thus situated, it is in a most favorable position, from the standpoint of function, mechanics, anatomy, and facial harmony."

Most orthodontists will agree that the position of the upper first permanent molar in the maxilla is subject to many variations. These variations in position constitute a part of diagnosis and treatment planning which should be considered before the mandibular first molar is related to the upper one when the classification of a malocclusion is determined. Atkinson, then, made a very significant observation when he pointed out that the position of the first permanent molar in the maxilla changes with growth, and thus with age. This brings us to another important consideration—the axial position of this tooth.

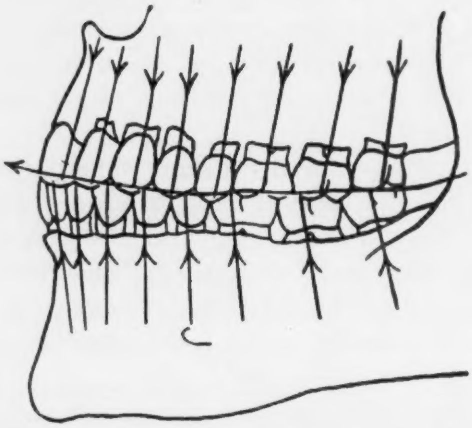


Fig. 1.—Axial inclinations of teeth are shown, indicated by vertical lines, which also represent the component force of each unit of the upper and lower denture meeting in the line of occlusion. The meeting of these two components resolves itself into a forward force. (From Salzmann, J. A.: Principles of Orthodontics, ed. 1, Philadelphia, 1943, J. B. Lippincott Company.)

Axial Position of the Maxillary First Permanent Molar.—The second aspect of study to be considered here is the axial position of the maxillary first permanent molar, particularly the mesiodistal axial position. Stallard,[5] in 1923, developed the concept that all of the posterior teeth have a slight mesial inclination which, he felt, was due to the anterior component of force brought about by the action of the lower arch in mastication. He stated: "This anterior component of force causes an anterior drift of the crowns of the upper buccal teeth." This mesial inclination is in relation to the occlusal plane and is very clearly demonstrated in Fig. 1, an illustration from Salzmann's[16] textbook.

Stoller[6] studied the position of the maxillary first permanent molar and, although he discusses rotation, he is more concerned with the axial inclination. His study was made from plaster casts of adults with normal occlusions, from photographs of skulls, and from the casts of clinically treated cases. Fig. 2, taken from Stoller's article, indicates clearly the importance of this feature of position. It should be noted, however, that this mesial inclination is a feature of adult occlusion and may not be reached until the dentition is fully developed at maturity.

From the beginning of crown formation, or calcification, the mesial inclination of the posterior teeth (the molars) is an important factor in the development of normal occlusion and stability of the natural dentition. These teeth

must actually change from distal inclinations to mesial inclinations, as is well illustrated in Schour and Massler's chart depicting the development of the human dentition (Figs. 3 and 4). Not only does the axial inclination of these

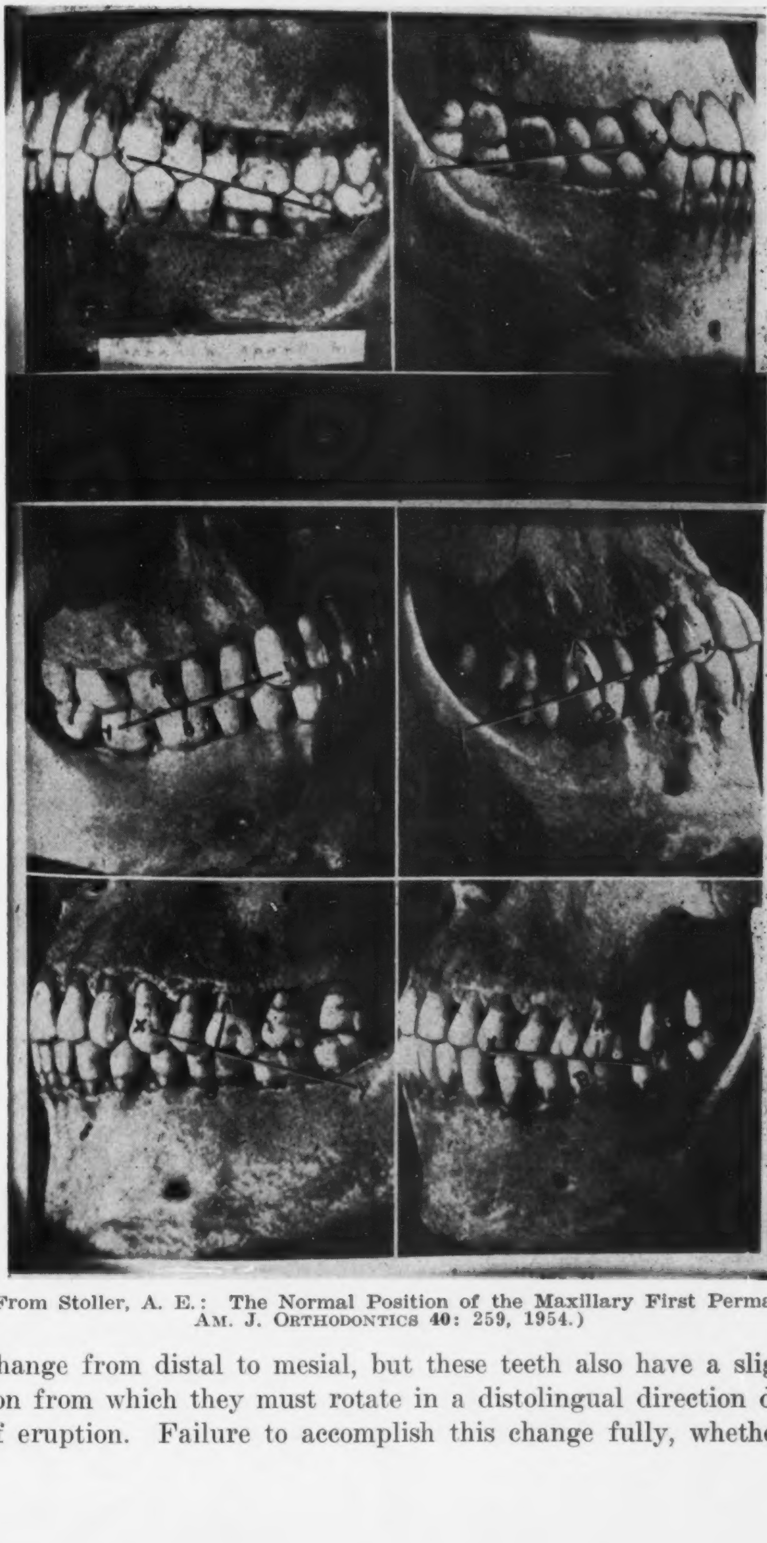


Fig. 2.—(From Stoller, A. E.: The Normal Position of the Maxillary First Permanent Molar, Am. J. Orthodontics 40: 259, 1954.)

molars change from distal to mesial, but these teeth also have a slight buccal inclination from which they must rotate in a distolingual direction during the course of eruption. Failure to accomplish this change fully, whether because

of a disturbance in growth and development or some other factor, causes rotated positions of these molars when they are in occlusion. This very common occurrence creates disturbing conditions to a greater or lesser degree, depending on

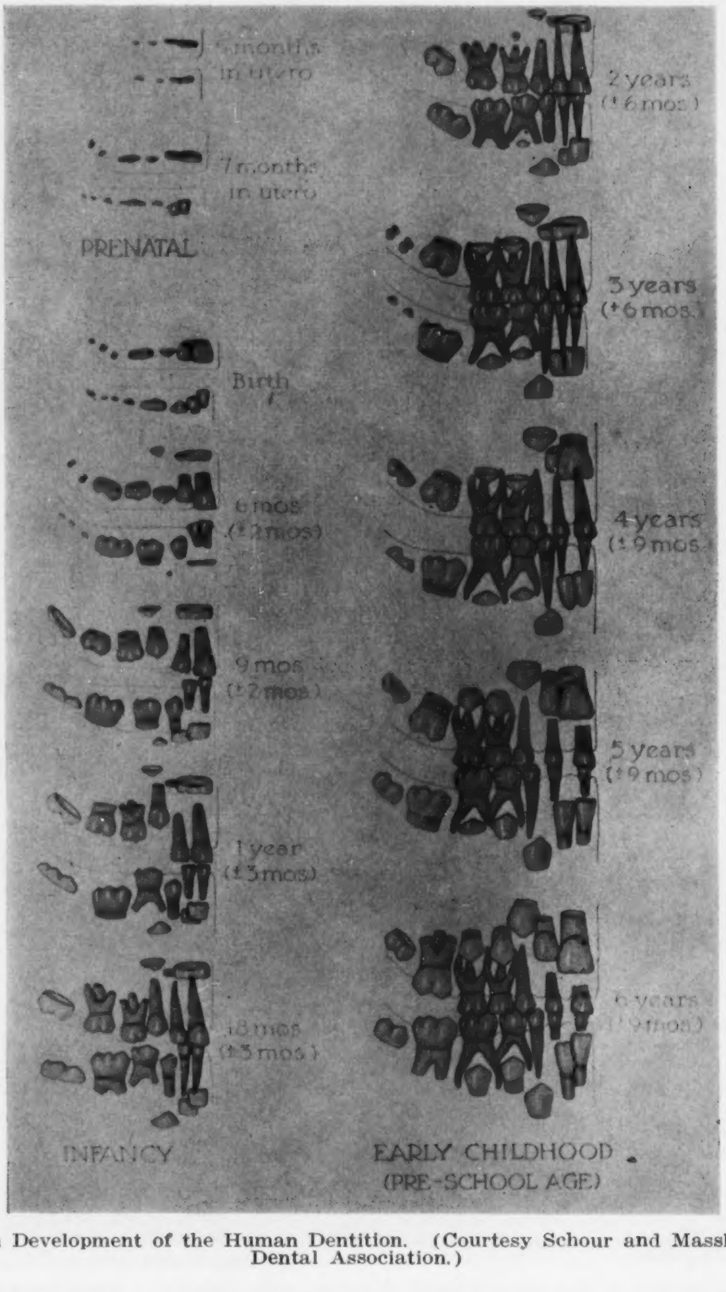


Fig. 3.—From Development of the Human Dentition. (Courtesy Schour and Massler, American Dental Association.)

the amount of rotation from what may be considered normal. This brings us to the third aspect of our study.

Approximating Relationship With Adjacent Teeth, or Rotation.—While the position of the maxillary first permanent molar in the maxilla, is most important,

this position is difficult to determine or to measure. Although several roentgenographic cephalometric studies are significant, the clinician must deal, more or less, with relative positions.

The axial inclination of this tooth is also difficult to measure, especially since it is a changing factor up to maturity.

Abnormal rotation, by which we mean rotation on the long axis of the tooth, presents a condition that can be measured with a reasonable degree of accuracy and with clinical significance. It will be our purpose to explore this subject more fully.

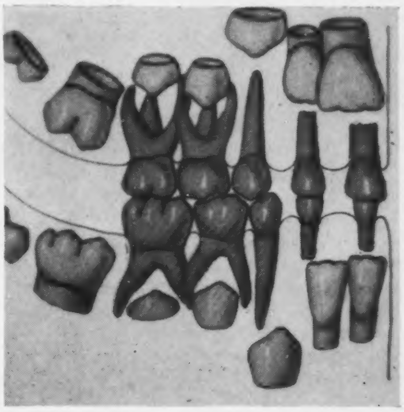
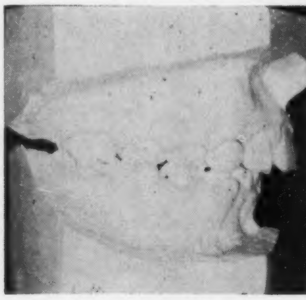


Fig. 4.—From Development of the Human Dentition at Age 5 (± 9 Months). (Courtesy Schour and Massler, American Dental Association.)

In 1920 Hellman,[8] discussing Angle's classification, made a most interesting and timely observation when he stated: "On examination of 800 cases of malocclusion, it is found that a very high percentage of instances of the upper molars are rotated. This rotation seems to occur in such a manner as to bring the buccal cusps into an even buccal plane with the rest of the teeth. This rotation seems to affect the position of the mesio-lingual cusp in such a manner as to influence its occlusion mesio-distally in a very slight degree, while the buccal cusps may, at the same time, appear to be in a decided malposition."

He further stated what has proved to be a most interesting fact influencing both diagnosis and treatment: "The pivotal point of rotation of the upper molar is in the region of the *longitudinal axis of the mesio-lingual cusp* [italics ours]. Secondarily, it demonstrates that the effect of such deviation is to allow the mesio-buccal cusp to assume a more mesial position than that of the mesio-lingual cusp, thereby leaving the mesio-lingual cusp either entirely in its primitive relation or to move considerably less than the buccal cusp. As a result, it will be found that, excepting in decided class II manifestations, in a great majority of so-called distal occlusion cases, the mesio-lingual cusp of the upper molar will be more nearly in its primitive relation, while the buccal cusps may definitely indicate a class II deviation." Such conditions are very clearly shown in Figs. 5 and 6.

Atkinson[14] supports Hellman's theory concerning the axis of rotation. He states: "In many instances in which the anterior teeth are lapped or crowded, there is a forward rotation of the maxillary first permanent molar. These teeth rotate readily, the lingual root acting as the center of rotation. The two buccal roots may rotate in a segment of a circle without breaking through the buccal plate of bone into the canine fossae."



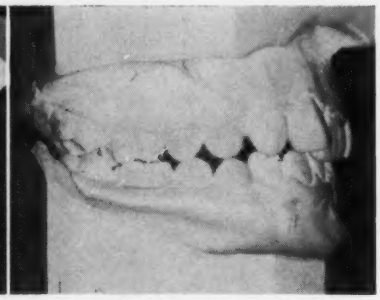


Fig. 5. Fig. 6.

Fig. 5.—Buccal view of model showing a rotated molar in a mixed dentition case. This is a Class I case, but it is developing into a Class II.

Fig. 6.—Buccal view of a model showing a rotated molar causing end-to-end positions of the premolars. This is a Class I case that will eventually develop into a Class II.

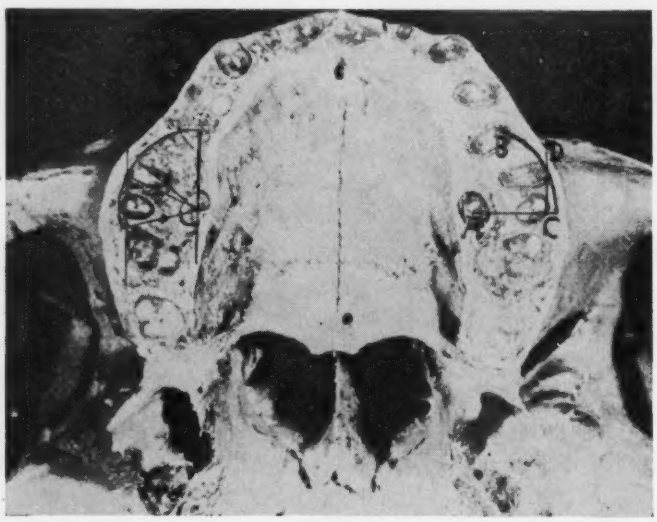


Fig. 7.—(From Atkinson, Spencer R.: AM. J. ORTHODONTICS 35: 815-836, 1949.)

This can be seen in Fig. 7, which is from the studies made by Dr. Atkinson.

The abnormal rotation of upper molars has been discussed many times in the literature, and techniques to effect the desired rotation back to normal have been described.

Crozat[9] has stated: "When the molars have been rotated and their occlusal relations brought up to normal, the anterior teeth seem to go to place easily." Hence, Crozat generally starts his treatment program by positioning the molars, and this frequently means rotating the upper molars as a first step.

It seems most important in diagnosis and treatment planning to be able to determine when a molar is abnormally rotated.

Most orthodontists are able, on the basis of clinical judgment and experience, to settle this question to their own satisfaction when dealing with individual cases. Because of the variability among individual patients, the clinician may need great skill to make an accurate diagnosis.

The literature is strangely silent concerning the measurement of abnormally rotated molars. One of the more significant studies is that of K. C. Smyth[10] of London, England, who studied six areas of etiological factors and presented diagnostic data as well as treatment recommendations in a very full and comprehensive discussion. However, Miss Smyth makes the following noteworthy comment: "In the diagnosis of rotations of molars it must be bourne in mind that the term 'rotation' is *a relative one* [italics ours]. Like many other problems in orthodontia, this condition has no fixed or definite standard of normality." We shall presently show the error of this statement.

In 1956 Henry[11] reviewed the literature and presented an excellent study on rotations. His material consisted of 115 cases, twenty of which were normal. He states: "The upper first permanent molars in the malocclusions studied are rotated in 83 per cent of the cases and the axis of rotation passes through the palatal root and the mesiolingual cusp." Henry also presented a method of measuring the degree of rotation, but his method does not seem to offer much help to the busy clinician.

In 1959 Friel[12] presented an excellent study which offers a more practical approach to diagnosis with clinical significance. After a careful analysis of the method that he employed and the results that he obtained, we considered it desirable to repeat this study for a further evaluation of Friel's norm value. Friel's method of measurement, in which the mesiolingual cusp point that Hellman[8] pointed out is used as a pivotal point and the median raphe is chosen as another landmark, appears very reliable. We felt that if we could verify his results we would have another important diagnostic aid.

At this point it seems advisable to indicate what we mean by the term *abnormally rotated molar*. As shown by Hellman and Atkinson, and also by Friel,[13] the molar rotates mesiolingually on its long axis, with the mesiolingual cusp and the lingual root acting as the center or axis of rotation. Fig. 8 shows a malocclusion with normal molar positions, and Fig. 9 shows a malocclusion in which molars are rotated according to our understanding of the term.

In order to acquaint our readers with Friel's study, we will quote extensively from his previously mentioned article:[12] "A rotated upper first permanent molar can be observed with experience, but observation alone will not determine the degree of the rotation. In order to discover the degree of rotation in different types of malocclusion, I have used the angle formed by a line joining the points of the mediobuccal and mediolingual cusps and the median raphe. The raphe is marked far back where the vault of the palate is nearly flat. [Fig. 10.] It seems to me that this posterior end of the raphe was less likely to be influenced by environment than the anterior. The apparatus to measure the angle of a

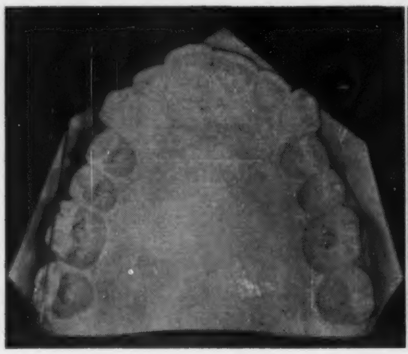


Fig. 8.

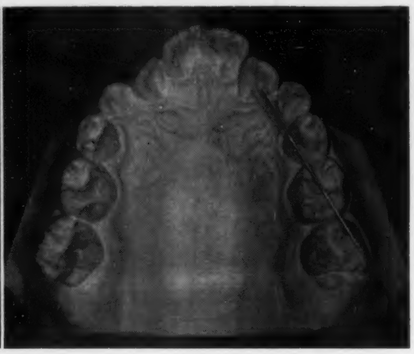


Fig. 9.

Fig. 8.—Occlusal view of model showing normal position of molars.
Fig. 9.—Occlusal view of model showing rotated molars.

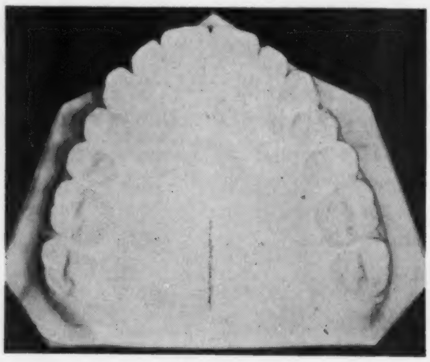


Fig. 10.—Model marked in median raphe.

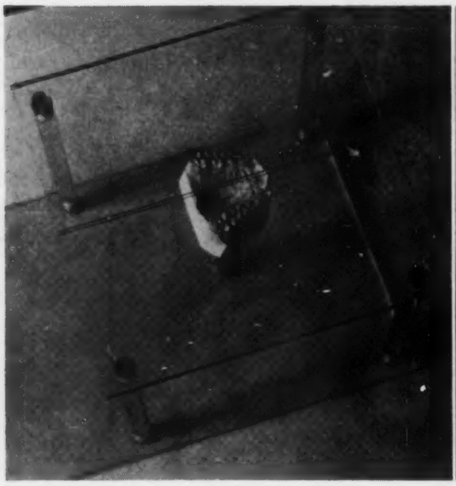


Fig. 11.

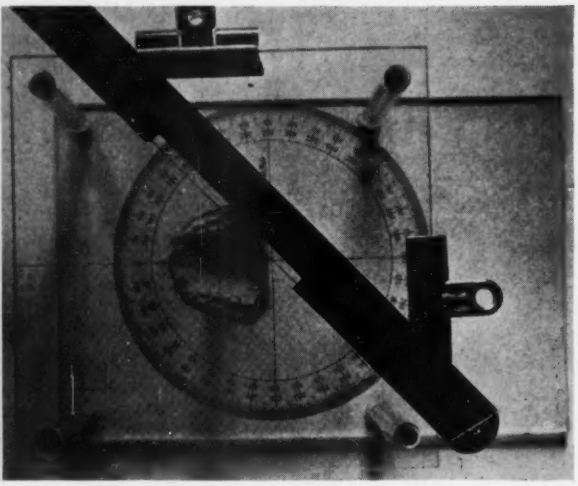


Fig. 12.

Fig. 11.—Friel's measuring apparatus. (From Friel, Sheldon: *D. Practitioner* **9**: 77, 1959.)

Fig. 12.—Friel's method of measuring abnormally rotated molars. (From Friel, Sheldon: *D. Practitioner* **9**: 77, 1959.)

line joining the two cusp points with the raphe consists of a sheet of perspex ¼ inch thick. A line is drawn antero-posteriorly on both sides of the sheet, each exactly opposite the other. [Fig. 11.] The sheet is supported on four pillars—the model is placed underneath the sheet and held in contact with it by a spring-loaded pointer. The model is now adjusted [Fig. 12] so that the three lines appear as one line. A tightly stretched fine wire is placed on top of the perspex sheet and in line with the points of the marked cusps. A protractor gives the angle of rotation.

"The investigation consisted of 34 cases of normal occlusion in the premolar-molar area. These cases were mainly first year medical students. The second group consisted of 30 cases of post-normal occlusion with labioclination of upper incisors and the third group of 30 cases where the upper second deciduous molar had been prematurely extracted. The results of this investigation showed that in the first group (the normals) the mean angle on the right side was 60 degrees and on the left side 57 degrees. In the second group (post-normals) the mean angle on the right side was 52 degrees and on the left side 51 degrees, and in the extraction group the right was 45 degrees and the left 47 degrees. These figures are given in round numbers. It was interesting to note that there was a significant difference between the right and left sides in the normals and in the post-normal cases, the left molar being more rotated. There was a significant difference between normals and post-normals on both sides. The extraction cases were far more rotated." Friel's findings are shown in Table I.

TABLE I. ROTATION OF UPPER FIRST MOLARS IN RELATION TO MEDIAN RAPHE OF PALATE

	NORMAL CASES		POSTNORMAL CASES		EXTRACTION CASES	
	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
Number	34	34	30	30	30	30
Mean (degrees)	59.78	56.71	52.12	51.30	45.55	47.03
Standard deviation	5.32	6.44	6.01	7.21	8.31	9.91
Error of standard deviation	0.91	1.10	1.10	1.32	1.52	1.81

For the present study, we constructed an apparatus from the description in Friel's published article (Figs. 13 and 14). Two lines on the top platform were used to orientate the model. Our method of measurement differed slightly from Friel's in that, instead of using the tightly stretched fine wire over the marked points of the two mesial cusps, we used a protractor directly, with the base line running through the cusp points and extending to the median line (Fig. 15). When we tested our method against that used by Friel, we could detect no difference in the results and our method seemed easier.

A study of fourteen skulls from persons of different ages indicated that the median raphe was reliable as a landmark, even though there might be some deviation in arch form. Figs. 16 and 17 show one of these skulls, that of a young adult (whose third molars have not fully erupted) with an excellent occlusion. Fig. 18 presents a palatal view of the skull shown in Figs. 16 and 17; the

median line is clearly shown, straight and well marked, by the well-defined median raphe. Even though there is a slight deviation in the arch form, the median line or median raphe is not disturbed. This median line is well defined and easily located on a good plaster cast; therefore, we have accepted its reliability as a landmark.

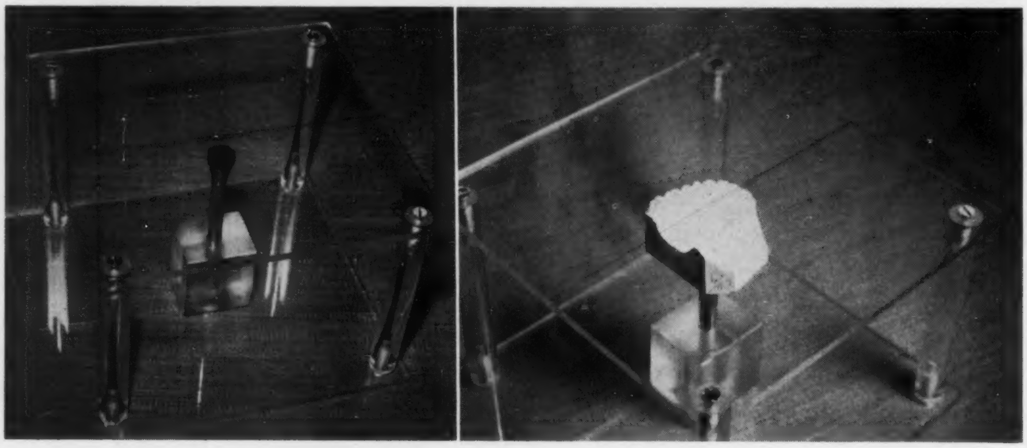


Fig. 13. Fig. 14.

Figs. 13 and 14.—Measuring apparatus constructed according to Friel's description. Note two lines on top platform for orienting model. (From Friel, Sheldon: *D. Practitioner* 9: 77, 1959.)

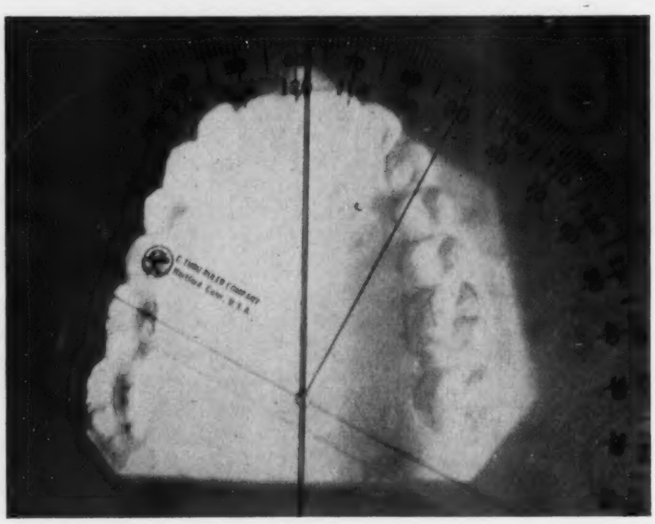


Fig. 15.—Protractor, with base line running through cusp points and extending to median line, used instead of Friel's tightly stretched fine wire over marked points of two mesial cusps.

In locating the points of the cusps so that they could be measured, we studied Friel's work on occlusion and have used his chart with the markings for the mesiobuccal and mesiolingual cusps which he describes (Fig. 19). The careful marking of these cusp points on the model is important, particularly as regards the mesiolingual cusp which frequently shows early wear. Fig. 20 shows a palatal view of the skull with anatomic markings on the cusp points.

Volume 47

The line AO indicates the median line, and the lines drawn through the cusp points and intersecting the median line AO would form the angles to be measured; thus, with R indicating the right side, the angle AOR would establish the position of the molar cusp points on the right side in relation to the median line. The angle $A\acute{O}L$ would establish the same for the left side.

Fig. 16. Fig. 17.

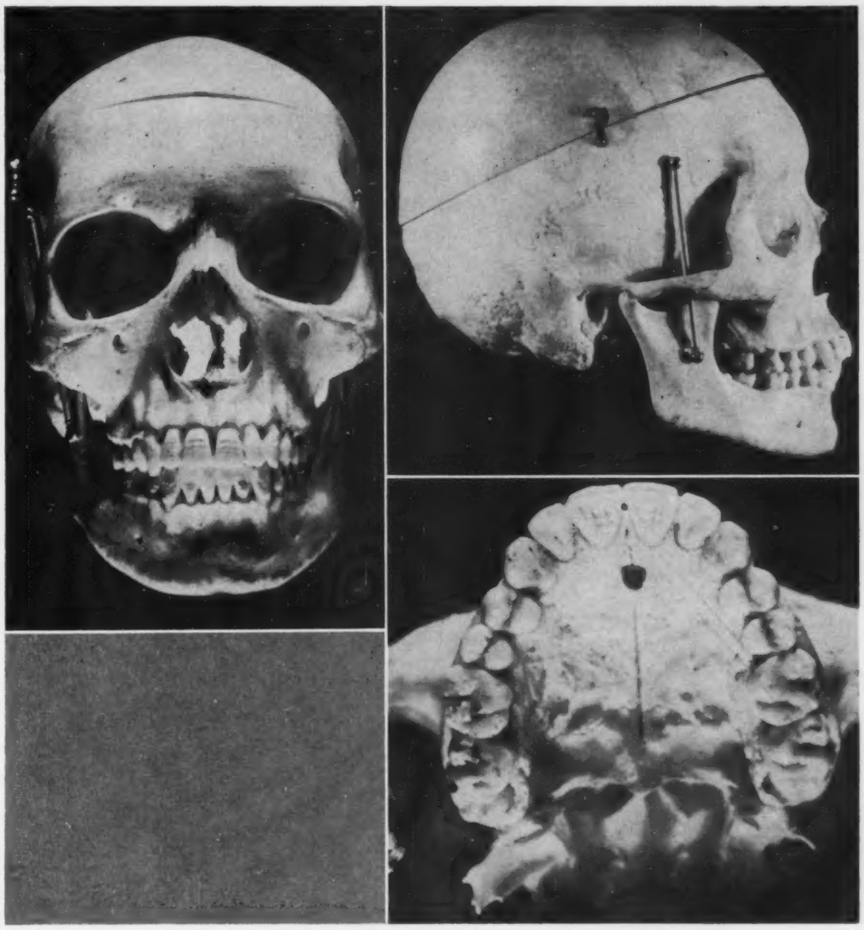


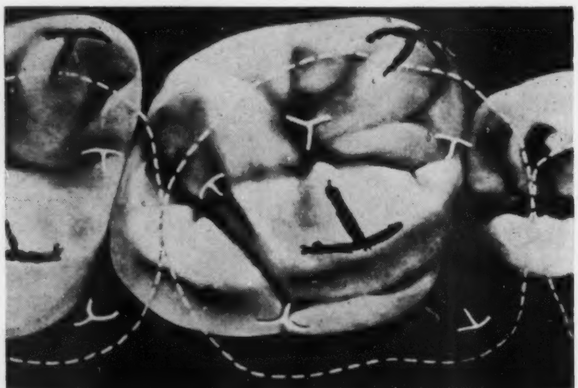
Fig. 18.

Figs. 16 to 18.—Various views of same skull showing median raphe as a reliable landmark.

For our study, two groups of satisfactory or normal occlusions were selected and measured. Our first group of cases consisted of sixteen third-year dental students whose occlusions were considered quite satisfactory and normal, although perhaps not ideal. The average age was 25 years plus. Friel did not consider ages in his group of persons with normal occlusions, but we felt that age was a significant factor in the amount of wear which the cusp points would show and the probability of error in locating these cusp points. We must admit, however, that the margin of error proved too small to be significant. The angle on the right side averaged 61.16 degrees, and that on the left side averaged 60.75 degrees.

Since we were dealing here with an older group in which considerable cuspal wear was shown, we deemed it advisable to test our measurements on a group of younger persons who might be more accurately measured because they would not show cuspal wear. Such a group was found at the School of Dentistry, University of Alabama. This series of cases had been collected by Drs. Wendell H. Taylor and Fayette Williams, Jr., as a result of a smile contest sponsored by the Junior Chamber of Commerce of Birmingham, Alabama.[15] From the series, we were able to select fifteen models with better-than-average occlusions.

Fig. 19.



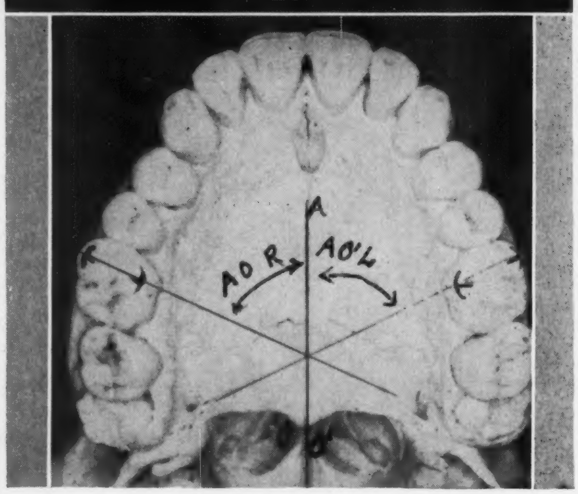


Fig. 20.

Fig. 19.—Marking of cusp points. The white dotted lines and cusp point markings represent the lower teeth.

Fig. 20.—Same palatal view of skull as in Fig. 18, with anatomic markings on cusp points.

They could be considered normal, and in most instances they approached the ideal. The fifteen cases included ten girls and five boys. (We did not consider sex a factor; it is mentioned here for information only.) The average age of this group was 10 years (plus). The measured molar angle on the right side averaged 61.6 degrees, and on the left side it averaged 62.2 degrees.

It seems rather significant that the measurements of our two groups were almost identical, although, when compared with Friel's normals, our series does

not show as wide a range of deviations or as much difference between the angles on the right and left sides as his studies show. A thorough study of all measurements does indicate that there is no significant difference between them. (See Table II.)

TABLE II. COMPARISON OF MEASUREMENTS OF SERIES OF FRIEL, EMORY STUDENTS AND ALABAMA SERIES

	FRIEL SERIES		EMORY SERIES		ALABAMA SERIES	
	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
Number	34	34	16	16	15	15
Mean (degrees)	59.78	56.71	61.16	60.75	61.6	62.2
Standard deviation	5.32	6.44	3.01	4.59	2.68	2.51

COMMENT

After analyzing our figures very carefully, we are led to the very safe conclusion that the angles of the normally positioned molars are 61 degrees, plus or minus 4 degrees, on the right side *(AOR)* and 61 degrees, plus or minus 4 degrees, on the left side *(AÓL)*. These may be considered as representing normals and stated in round figures.

Since our studies of the normal cases correlated so closely with Friel's, and since we were able to establish a probable normal measurement of angles ***AOR*** and ***AÓL***, we did not consider it necessary to duplicate his studies of postnormal and extraction cases further. Rather, we felt that another approach might be desirable. Accordingly, the first twenty-five cases accepted for treatment (by one of us) in 1953 were selected for study. The average age was 10 years 11 months, and the age range was from 8 years 0 months to 14 years 10 months. There were thirteen Class I cases and twelve Class II cases. (The cases were not subjected to a strict classification, however, since this was not considered significant.)

If one of the maxillary first permanent molars was rotated, then the patient was considered to have rotated molars (at least for the purpose of this study). In five of the Class I cases one or both molars were rotated; in the other eight Class I cases molar positions were considered normal, that is, with respect to rotation.

Of the Class II cases, one was a Class II, Division 2, and the others were Class II, Division 1. The Class II, Division 2 case showed normal molar positions, and in one of the Class II, Division 1 cases molar positions were considered to be normal (although this could be questioned).

It seemed significant to us, then, that out of twenty-five cases selected for study, eight could be considered to have normal molar positions, whereas in the remaining thirteen cases molars would be rotated to some degree. It also seemed significant that in all of the Class II, Division 1 cases, with the possible exception mentioned, there would be rotated molars. It is our estimate, based on observation but not on actual study, that in at least 90 to 95 per cent of all Class II, Division 1 malocclusions maxillary molars are rotated to a greater or lesser degree.

In further support of our thesis that the abnormal rotation of these maxillary molars is of major importance in both diagnosis and treatment planning, two cases will be presented.

CASE 1.—The patient was E. H., a normally developed, healthy girl aged 7 years 1 month. Figs. 21 to 24 show the models made on Jan. 2, 1951. (We are using models to illustrate these cases, since they show the posterior relationship of the teeth more clearly.)

Fig. 21. Fig. 22.

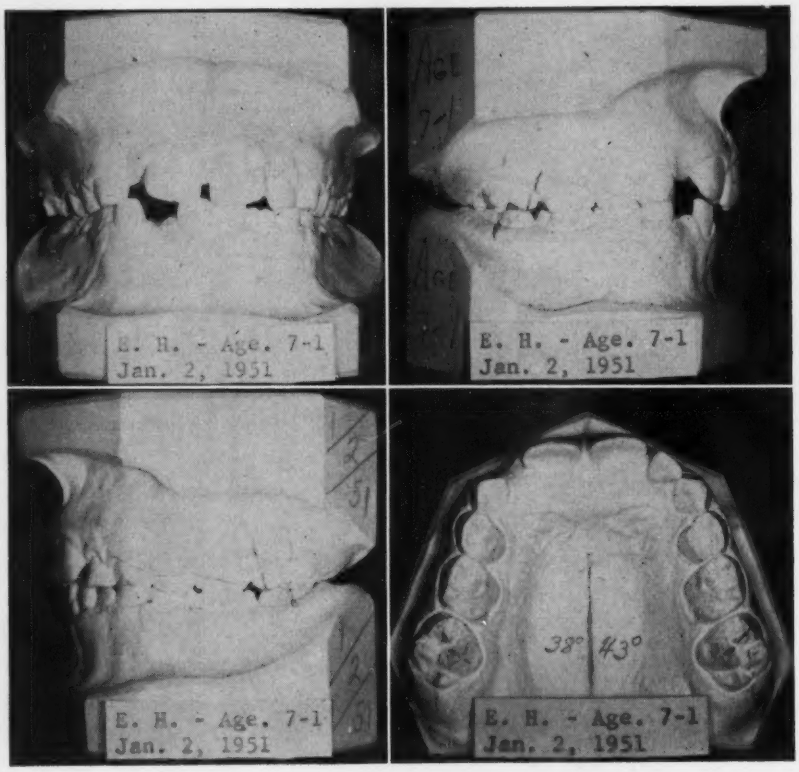


Fig. 23. Fig. 24.

Figs. 21 to 24.—Case 1. Models made on Jan. 2, 1951, at beginning of treatment.

From the anterior view (Fig. 21), this occlusion would seem to be within the range of normal for this age. The lateral views of the model (Figs. 22 and 23) indicated an extreme rotation of the upper first permanent molars and a very evident Class II arch relationship, although, viewing the deciduous teeth, this might be said to be a beginning Class II relationship. An occlusal view of the upper arch (Fig. 24), showed the extreme rotation of the molars. On the right side the rotation was a rather extreme 38 degrees (or 23 degrees less than normal), and on the left side it was 43 degrees (or 17 degrees less than normal). The patient was treated at this age. By means of a simple removable lingual arch (Mershon type), the molars were rotated to normal positions in about eight months. No other appliance of any type was used. We might also point out that there was not enough room for the upper lateral incisors to erupt in good positions. This was the particular concern of the referring dentist. Fig. 25 shows an anterior view of the models made on Feb. 2, 1953, when the patient was 9 years 2 months of age, twenty-one months after the appliance had been removed. By this time the upper lateral incisors had erupted and were in reasonably good positions. Figs. 26 and 27 show the positions of the right and left maxillary first

Fig. 25.

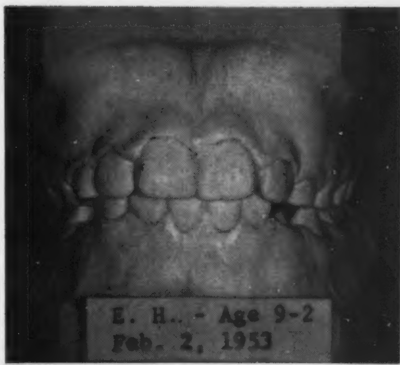
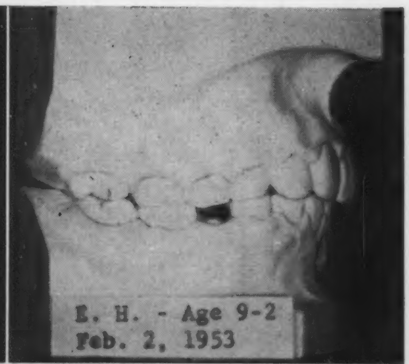


Fig. 26.



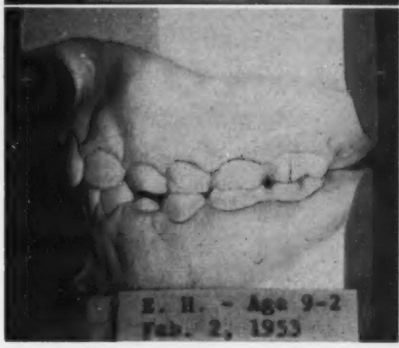


Fig. 27.

Fig. 28.

Figs. 25 to 28.—Case 1. Models made on Feb. 2, 1953, twenty-one months after the appliance, a simple removable lingual arch, was removed.

Fig. 29.

Fig. 30.

Fig. 31.

Fig. 32.

Figs. 29 to 32.—Case 1. Models made on Feb. 2, 1960, nine years after completion of treatment.

permanent molars after they had been rotated to place. The normal positions of the maxillary molars can be easily seen in Fig. 28 (occlusal view). The molar on the right was rotated and maintained a position of 62 degrees from the median raphe; on the left side the molar maintained a position of 66 degrees.

There has been no further appliance therapy of any type in this case. Although the patient was seen at regular intervals and further appliance therapy was considered several times, it was felt (after much discussion with the parents) that the amount of improvement to be gained was not sufficient to warrant further treatment. Additional models were made on Feb. 2, 1960 (Figs. 29 to 32). At this time the molar positions were 63 degrees on the right side and 65 degrees on the left. The 1 degree change in the position of each tooth is not significant.

In the preceding case, discovery of the severe rotation of the upper molars when the patient was 7 years of age and subsequent treatment to bring them back to correct positions removed interferences with growth and development. Consequently, the arches and the occlusion were allowed to develop in normal relationship, so that, with this small amount of treatment, the patient grew to have an acceptable normal occlusion.

Fig. 33. Fig. 34.

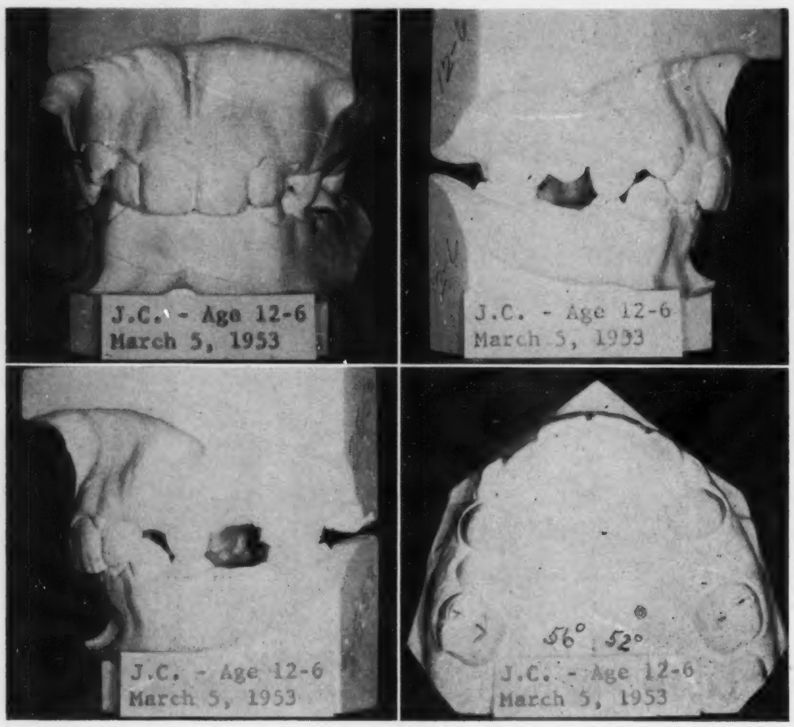


Fig. 35. Fig. 36.

Figs. 33 to 36.—Case 2. Models made on March 5, 1953, at beginning of treatment.

CASE 2.—Patient J. C., a 12½-year-old boy, had no problems of development or health that we could uncover at the time of his original examination. The patient had an excessive overbite (Fig. 33). The upper cuspids were beginning to erupt, and it was very evident that they would be in labial positions (Figs. 34 to 36). The position of the upper first permanent molars was determined to be definitely rotated, and this case would no doubt be placed in the Class II, Division 2 category. We feel, however, that this was a Class I malocclusion and that the upper first permanent molars were mesially positioned and rotated,

as a result of which the premolars were in a mesial position and the cuspids erupted in a labial position. The right molar was rotated to a position of 56 degrees and was within 1 degree of normal (61 degrees – standard deviation of 4 degrees = 57 degrees). By the same measurement, the left molar, at 52 degrees, was 5 degrees from normal.

A careful study of all problems involved seemed to indicate that these molars should be positioned on the plus side of the average or mean standard. Accordingly, the first objective of treatment was to rotate the upper molars to more than normal positions, so that they would either settle distally or be moved distally in the course of treatment to the point where enough room would be developed for the upper cuspids; correction of what appeared to be a Class II arch relationship was also an important treatment objective. Models were made again on Sept. 4, 1956, when the patient, then 16 years old, had been out of retention for approximately one year (Figs. 37 to 40). At this time the upper first molar positions were found to be 65 degrees on the right side and 68 degrees on the left side, which seems a great deal more than our standards for normal. These measurements are in the top range of our "normals." We believe that the explanation lies in the shape of the arch, or the arch form, and we call attention to the width in the molar area.

Fig. 37. Fig. 38.

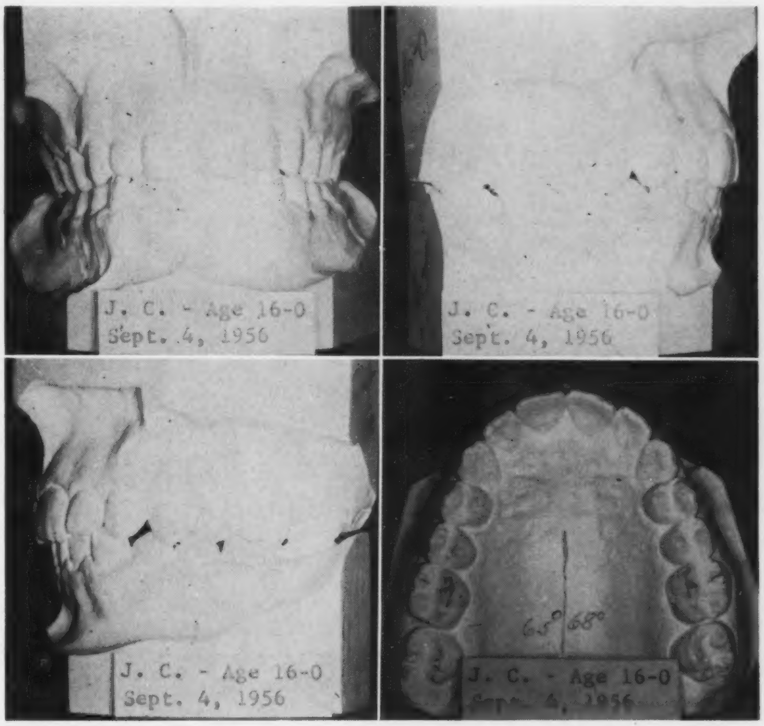


Fig. 39. Fig. 40.

Figs. 37 to 40.—Case 2. Models made on Sept. 4, 1956, when patient had been out of retention about one year.

The arch in Case 2 probably demonstrates what Strang[18] had in mind when he spoke of normal form of the maxillary arch: "The buccal surface of each first premolar is located slightly buccally to the labial surface of the canine and the buccal surface of the second premolar and the mesial half of the first molar is placed progressively further buccally. The buccal ridge on the mesio-buccal lobe of the first molar stands out so far buccally that it gives the arch form a distinct offset buccally as it passes from the second premolar to the first molar area."

A different type of arch form is seen in the next case.

Case 3.—Figs. 41 to 45 show models of B. E., a man with an excellent occlusion that was, in fact, almost an ideal occlusion. This was an untreated case. Cuspal interdigitation and molar relationships were excellent. In both jaws there was a flatness on either side of the arch; in other words, the cuspid and buccal cusps of the premolars and molars were in an almost straight line (Figs. 44 and 45). The molar positions were 58 degrees on the

Fig. 41.

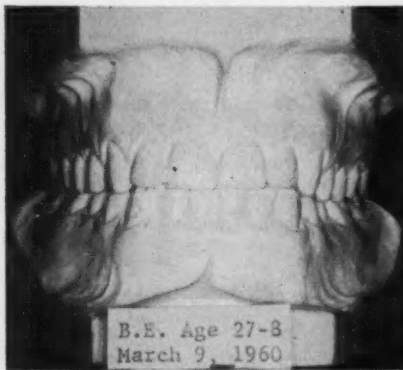


Fig. 42.

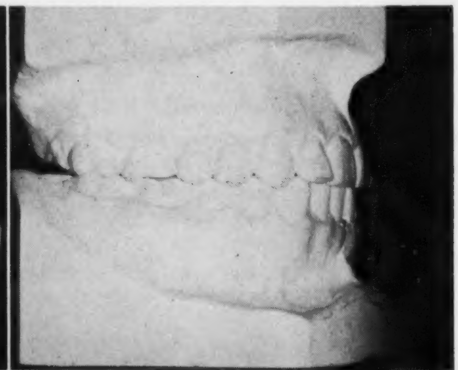


Fig. 43.

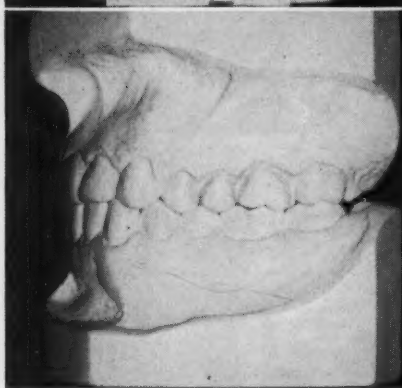


Fig. 44.

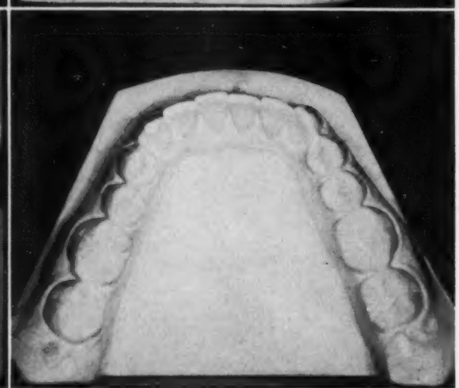


Fig. 45.

Figs. 41 to 45.—Case 3. Models showing almost ideal occlusion in untreated case.

right side and 59 degrees on the left side. This would be approximately 3 degrees less than our standard of normal on the right side and 2 degrees less than our standard on the left side. However, since we are dealing with biologic material and must accept the standard deviation, these two molars are within our range of plus or minus 4 and must be considered normal.

Because of the contrast which is shown, attention is again directed to the shape of the arches pictured in Figs. 40 and 45. The angle of rotation of the

molars in relation to the arch form will probably be on the minus side of the mean standard where the arch is tapering and on the plus side where the arch is ovoid.

Important, also, is a determination of probable arch form for the individual patient when one is studying a malocclusion to determine the amount of molar rotation that may be needed, for Class II, Division 1 cases (particularly in the mixed-dentition stage) show a flatness in the posterior sections, as shown in Figs. 46 and 47.

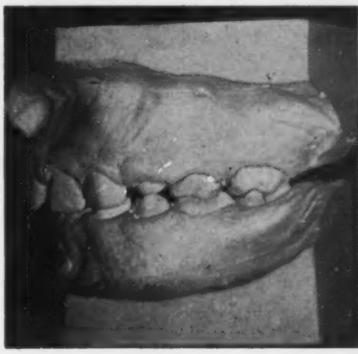


Fig. 46.

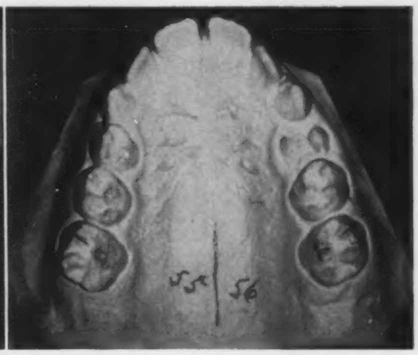


Fig. 47.

Fig. 46.—Lateral view of a Class II, Division 1 malocclusion in mixed-dentition stage.

Fig. 47.—Occlusal view of model shown in Fig. 46. Note the long tapering arch, flat buccal sections, and rotated molars.

Fig. 48.—Plastic 5 inches square and ¼ inch thick. The two lines on either side, which are directly opposite each other, are guide lines.

DISCUSSION

In repeating Friel's study on the rotation of the maxillary first permanent molar, we have been able to verify his result and to establish a method of measuring the degree of rotation. This has enabled us to establish a norm measurement which is reliable, within limits, as a diagnostic aid.

In addition, we have simplified the method of measurement so that it becomes more useful to the busy clinician. With this simplification, we simply use a piece of ¼ inch plastic, 5 inches square (Fig. 48), with the two lines, one on each side and directly opposite. Notches cut on the sides receive a heavy rubber elastic which will hold the model in place. An inexpensive protractor completes the equipment. Care must be exercised in marking the tips of the mesiobuccal and mesiolingual cusps and also the median raphe. With only a little experience in lining up the two guide lines with the marking of the median raphe, one can obtain very reliable readings.

To test this simple method, we had four postgraduate students measure thirty-three models of third-year dental students with excellent occlusions. Sixteen of these were previously reported in our study (Emory Series, Table II). Each student was asked to measure independently, without assistance or comment from another student. Two students, W. H. and R. H., had been in the department for one year. Their measurements, when averaged, were almost identical. The other two students, F. B. and K. T., had been in the department for one month. Their measurements of the left molar were almost identical, and their measurements on the right side showed a 2 degree variation. This variation is not significant and, because the results obtained by the four students so closely paralleled each other, we can accept this simplified method as being very reliable.

One important aspect of abnormally rotated molars is the extra space which they occupy in the arch. This is because of the rhomboid shape of the crown. Fig. 49 illustrates this very clearly. Note how the molar (left side) has been pivoted around the mesiolingual cusp, so that two buccal cusps have moved distally and the transverse ridge on the occlusal side of the upper molar is positioned correctly in the distal groove of the lower molar.

A great deal of space may be gained by correction of abnormally rotated molars, and *this one factor should be considered fully before one ever resorts to the extraction of premolars.*

A quick way to check rotations on models is to rotate the upper model on the lower so that the molars are in ideal occlusion. If the lower first molar is in good position, this rotation of the model will indicate the amount of rotation necessary to correct the position of the upper molar; also, an idea of the amount of space to be gained can be obtained. This is shown very clearly in Fig. 50.

Cephalometric roentgenograms cannot be used to measure the rotation of molars. In most instances the molars cannot be seen in these pictures. Rotations must be determined from a study of models, but some indication may be obtained from studying the occlusion clinically in the mouth.

In our studies we have related the amount of rotation of these molars to the arch form (square, tapering, and ovoid) and, although we are convinced that there is a correlation, we feel that this needs further study.

METHODS OF ROTATION

Several methods for rotating molars have been discussed in the literature. We will discuss three techniques in order to bring out certain points which we feel are significant.

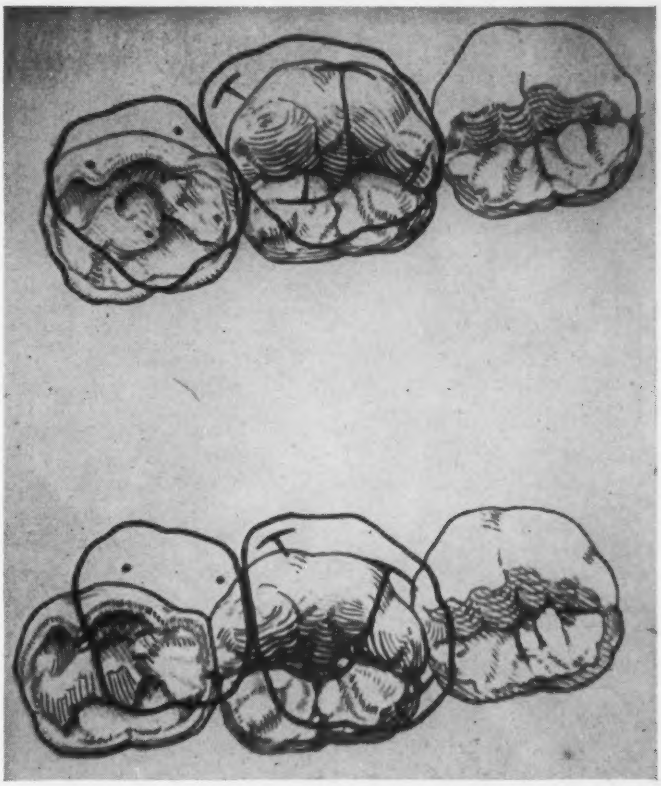


Fig. 49.—The shaded teeth are the lower ones; the outlines represent the upper teeth. The abnormally rotated first permanent molar is on the right side. (Courtesy of Dr. Sheldon Friel.)

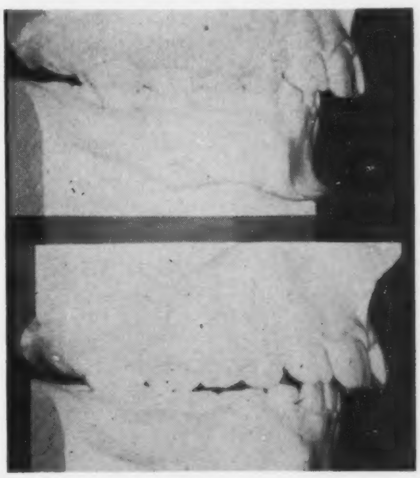


Fig. 50.—The top model shows the usual Class II, Division 1 occlusion with rotated upper molars. The lower model shows what happens when the upper molar is rotated back to its correct relation to the lower.

Attention has been called to the importance of the mesial tipping, or the mesial axial inclination, of the molar teeth. Wheeler,[17] in his text on dental anatomy, indicates that this is approximately 10 degrees from the occlusal plane

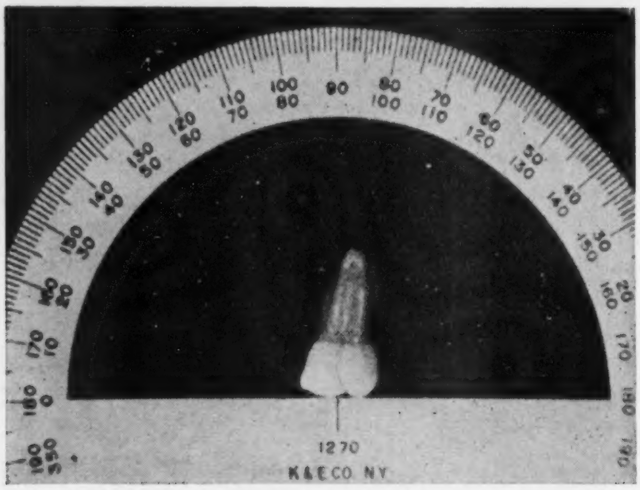
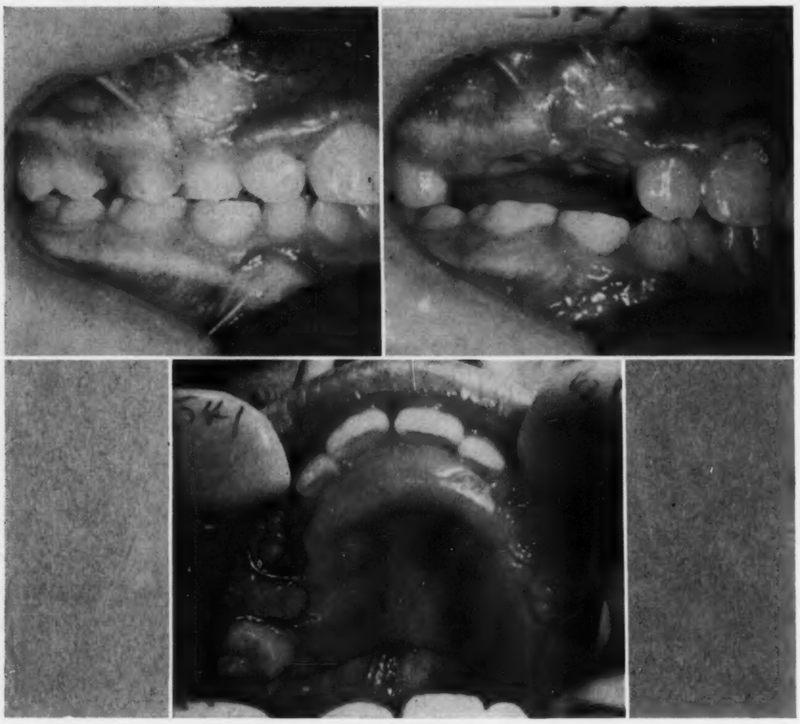


Fig. 51.—(From Wheeler, Russell C.: Dental Anatomy and Physiology, ed. 3, Philadelphia, 1958, W. B. Saunders Company.)

A. B.



C.

Fig. 52.—Intraoral photographs of boy who was 10 years 5 months of age when treatment was begun. *A*, At time plate was inserted, the maxillary first molar had drifted mesially and rotated following loss of deciduous second molar. *B*, Condition fifteen months later when plate was discarded. *C*, Plate in position.

(Fig. 51). Mesial tipping should be borne in mind during and at the end of treatment. No matter what method is used for rotating, the end result must not violate this principle of position if stability is to be maintained.

First, a very simple method for rotating involves the spring plate, which is made of acrylic, with chrome alloy wire (size 0.028) engaging the mesial surface. This technique allows for free movement of the tooth in function, which helps in the return (rotation) of the tooth back to its normal position. The tooth is actually pivoted buccally and distally around the lingual root and the mesiolingual cusp, or the reverse of the direction it traveled to reach its abnormal position. The stability of the plate is excellent when light adjustments are made. One exception is the case in which the vault is very shallow.

This principle is illustrated in Fig. 52, which shows the mouth of a boy aged 10 years 5 months. Fig. 52, *A* shows the condition when the plate was put in. The maxillary first molar had drifted mesially and rotated following the loss of the deciduous second molar. The plate was worn all the time for six months, and then at night only. Fig. 52, *B* shows the case one year three months later, at the time the plate was discarded, and Fig. 52, *C* shows the plate in position. The amount of rotation and distal movement can be seen very clearly by noting the relation of the tooth to the plate and wire.

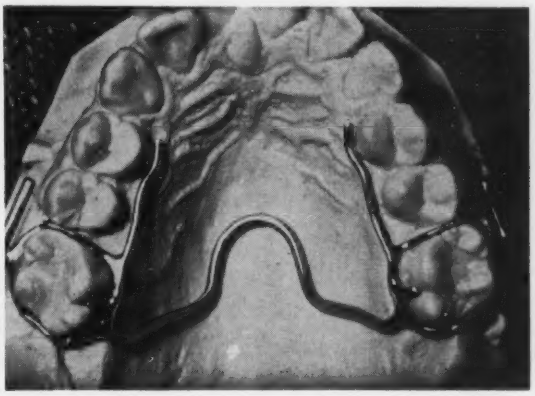


Fig. 53.—Upper Crozat removable appliance.

This method may also be used very advantageously in bilateral as well as unilateral conditions. It is particularly useful as a beginning part of treatment in those Class II, Division 1 cases (Figs. 46 and 47), started just prior to the exfoliation of the second primary molars, especially if a slight opening of the bite is necessary. When the molars are rotated, treatment may be continued with a twin arch or other setup and produces a very easily managed and satisfactory result.

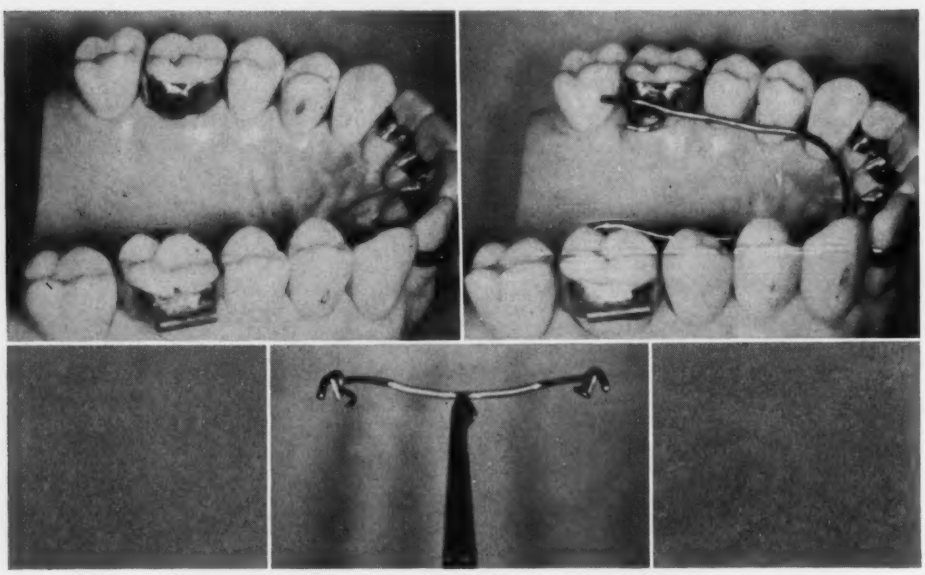
A second method, and perhaps the one of personal choice, calls for the use of the Crozat removable appliance (Fig. 53). Since the teeth are not held rigidly, as with a fixed appliance, they are allowed complete function. With this method, a small amount of expansion in the molar area can be gained, which

is almost always necessary in treatment of Class II, Division 1 cases. The appliance may be extended for additional movement of other teeth, and frequently this may be accomplished along with the rotation of the molars.

The third method involves the use of the Mershon type of removable lingual arch. This appliance is almost universally used, and when certain principles are followed it becomes a most useful and desirable mechanism. In the order of procedure, three areas encompassing these principles may be outlined as follows: (1) placement of the half-round tube, (2) amount of adjustment, and (3) manner of adjustment. These steps are illustrated in Fig. 54.

1. The half-round tube must be placed in a very definite position on the band, in relation to the crown of the tooth and to the lingual root. It should be positioned very slightly forward from the center of the crown, mesiodistally, and with a mesial inclination of approximately 10 degrees (Fig. 54, *A*). This

A. *B.*



C.

Fig. 54.—Mershon type of removable lingual arch. *A*, Placement of half-round tube. *B*, Adjustment of arch. *C*, Posterior view of arch showing both posts inclined toward median line, an inclination which they should retain when adjustments are made.

is also the position indicated by Wheeler and advocated many years ago by Oren A. Oliver. When properly placed, the tube is in line with the long axis of the lingual root of the tooth, both mesiodistally and buccolingually; hence, the adjustment for rotation can be made in harmony with the long axis, and the pivoting of the tooth is accomplished naturally.

2. The amount of adjustment should be light and in harmony with tissue tolerance. When the arch is adjusted from one side (Fig. 54, *B*), the half-round post on the opposite side should lie distal to the half-round tube by the width of the post. When both sides are thus adjusted for the rotation of right and left molars, the arch has lost some of its lateral width. This must be restored

so that the distal sides of the teeth will stay in position while the mesial sides move buccally in rotation. When a slight degree of molar expansion is necessary, it may be accomplished with further adjustment at this time. A word of caution: *Do not over adjust.* Heavy or excessive adjustment will cause the teeth to tip away from the desired movement and result in tipped positions.

3. The third principle which should be adhered to is that of keeping the adjustment so that the roots of the teeth will not be tipped buccally or lingually. When the arch itself is seen from a posterior viewpoint (Fig. 54, *C*), it will be noted that both posts are inclined lingually toward the median line. When the adjustments are made, these posts should retain the same lingual inclination. In maintaining these positions (inclinations) the relation of the arch to the root is maintained, and again, as in the second principle, the tooth can more easily pivot around the lingual root as the axis of rotation.

CONCLUSIONS

1. The position of the maxillary first permanent molar is of great importance to the clinical orthodontist.

2. Three positions of this tooth are significant: (a) position in the maxilla, (b) axial inclination, and (c) rotation on the long axis. Of these three positions, one (rotation) may be measured.

3. By using Friel's method, that is, forming an angle by means of a line running through the points of the two mesial cusps and intersecting the median line in the palate, one can make a definite measurement in degrees. This measurement can be given a norm value. We found this to be 61 degrees, with a standard deviation of 4 degrees, for both right and left molars.

4. Measurement of the angle has been related to arch form, but this needs further study.

5. This method of measuring the angles to determine the degree of abnormal rotations has practical clinical value.

We wish to thank Dr. Stephen Gray, of the Anatomy Department of Emory University, for his help in the interpretation of our figures and for working out the standard deviation in Table II.

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THE POSITIVE TRANSLUCENCY: A SUBSTITUTE FOR THE CEPHALOMETRIC TRACING AND A MEDIUM FOR DYNAMIC SERIAL EVALUATION

RAYMOND C. THUROW, D.D.S., MADISON, WIS.

ONE of the most distinctive features of cephalometrics is the procedure of making a hand-drawn tracing from the original radiograph. This tracing is the major source of cephalometric information, in many cases actually reducing the original radiograph to a mere intermediate step.

Because it is such a vital part of the cephalometric technique, tracing has been accepted almost without question as the method of choice for extracting information from the radiograph. However, the process of transferring a picture from a radiograph to a tracing creates serious problems, both in the preservation of accuracy and in demands on the operator's time.

Accuracy and detail in a tracing are totally dependent upon the care and skill of the operator. Making a tracing is laborious and time-consuming at best, and there is always the temptation to make haste at the expense of a little accuracy in "unimportant" areas. Along with this, there is the purely mechanical problem of using a fine, sharp pencil line to represent a relatively fuzzy, indistinct radiographic shadow.[1] The resulting errors are usually small, but they always leave an element of doubt. Such doubt is especially serious in cephalometrics, since there is no way to verify accuracy later from the tracing. A tracing must be accepted on faith alone.

A related problem is that of deciding how much detail to include in each tracing. Here we are limited both by time and by the fact that we soon reach a point where additional detail merely adds confusion to the maze of lines. The result is that each practitioner traces only those structures which he considers important for the problem at hand, eliminating all others from future consideration.

Because it completely eliminates the need for drawing anatomic structures, the positive translucency prevents these losses in accuracy and detail, reduces demands on the investigator's time, and still retains all the advantages of the familiar tracing. Instead of a negative like the original radiograph, or a pencil outline like the tracing, the investigator works with a fully detailed positive picture on a light background. This picture is produced on a translucent film

Presented before the Central Section of the American Association of Orthodontists at St. Louis, Missouri, Sept. 20, 1960.

which accepts pencil and ink even better than the conventional acetate tracing films, so that reference lines can be drawn and measurements made as soon as the picture is received from the technician.

In addition to serving as a substitute for the tracing, the positive picture has unique characteristics of its own which make possible a new and much more productive approach to serial evaluations.

Positive translucencies can be made by any technician, with little more training than is required for processing radiographs.

USE OF THE POSITIVE TRANSLUCENCY AS A SUBSTITUTE FOR THE CEPHALOMETRIC TRACING

The positive translucency is a full-size, fully detailed reproduction of the original radiograph, with dark and light areas reversed. Teeth and metallic objects appear darkest, while the background remains clear. This provides much better viewing conditions than the original radiograph, and it gives good visibility of lines drawn for measurement.

The positive is made on a special film which has a matte writing surface on *both* sides. This allows the profile to be faced in either direction for study. The availability of two surfaces also makes it possible to draw and erase temporary lines on one side without disturbing other lines drawn on the opposite side.

Two positives can be superimposed in the same manner as two tracings.

The advantages and disadvantages of substituting the positive translucency for the cephalometric tracing are as follows:

Advantages

1. Since the positive is prepared by auxiliary personnel, the investigator has more time for actual study and analysis.
2. The positive translucency includes all details of the original radiograph, keeping the complete picture in front of the investigator as he makes his analysis. Areas which might have been omitted from a tracing are not as easily overlooked or forgotten later.
3. Reproduction is dimensionally accurate; there are no tracing errors.
4. Lines can be drawn on either side of the film.
5. The fuzziness and other deficiencies of the radiograph are always before the investigator as he uses the positive. He is not misled by the *apparent* exactness of a pencil line drawn to represent the best estimate of such hazy details.

Disadvantages

1. The technique requires an added investment in equipment, although there is little need for additional working space.
2. Two positives can be superimposed for comparison, but viewing becomes difficult with more than two.

USE OF THE POSITIVE TRANSLUCENCY FOR DYNAMIC SERIAL ANALYSIS

This new technique for cephalometric investigation is based on the unique relationships that exist between positive and negative photographic images. We are all familiar with the ordinary snapshot print and its film negative. A radiograph is also a negative, with transparent shadow areas and a black background. The positive translucency is a print of the radiographic negative, made on special film instead of on paper.

If we superimpose a radiograph and its positive, we find that areas which are light on one are dark on the other, so that the entire picture cancels out in a single shade of gray. Shifting the two films slightly out of exact alignment makes the picture jump out boldly in bas-relief, with all of the major features accented in outlines of black and white. The bas-relief effect is little more than an interesting curiosity when the positive and negative are from the same radiograph; it becomes useful to us only if the two films represent *different* radiographs.

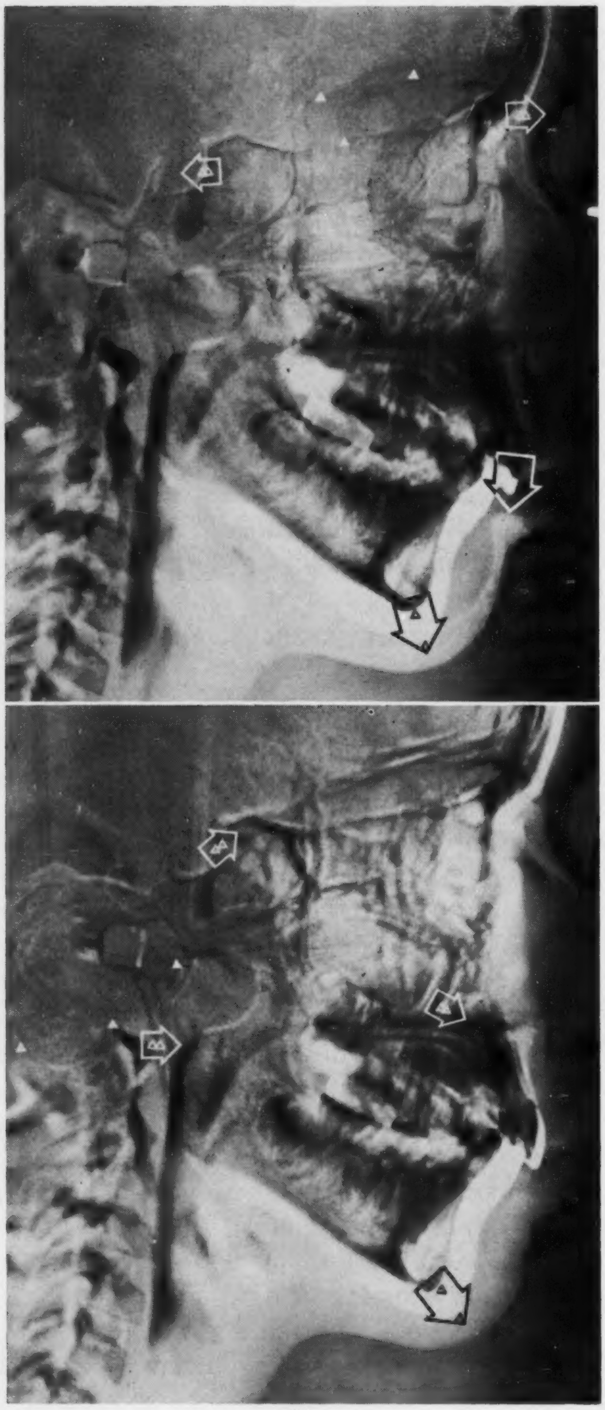
With the positive and negative from two different radiographs, it is no longer possible to superimpose the entire picture at once. There are always differences between the two pictures, so that we see the cancelling-out effect of exact superimposition in one area at the same time that we see a bas-relief effect in another. Differences between the two films show clearly in the adjacent dark and light images, since each structure that is dark on one film is light on the other. This effect makes it possible to superimpose the films successively on different areas and to study areas and directions of change from each base of reference.

The possibilities are almost endless, depending on the field of interest. Growth and treatment can be evaluated area by area, with the investigator seeking out small and large changes. Mandibular position can be studied with accuracy and detail unattainable with conventional techniques. Boldly outlined structures, such as teeth, sinuses, and facial profile, are particularly striking. Many areas that have been neglected until now because they are difficult to trace can be readily identified and studied.

This method is most productive when the investigator manipulates the two films during the evaluation, changing points of superimposition and picking up different details one by one. Fig. 1 shows the gross effect at several typical stages in such a continuous scanning of the total picture. In practice, this scanning can be quite rapid, since by making a slight shift here and there one can quickly identify a point and go on to the next. It is much more difficult to interpret a static superimposition, such as must be used for a printed illustration, for there can be no movement to help separate structures on the two films.

This method of serial evaluation is much more sensitive to variations in small details than the tracing method. This puts an added premium on accurate orientation of the patient. For most purposes, exact duplication of the patient's position will give the most useful information. If there is a slight change in orientation of the patient from one film to another, it will be found

A.



B.

Fig. 1.—Positive and negative superimposed, with registration on different areas of the head. The positive was made from a radiograph of a 9-year-old patient. The negative radiograph was made two years later, following treatment with cervical anchorage and bite plane. This case is presented only as an illustration of the superimpositioning technique and not as an illustration of treatment results.

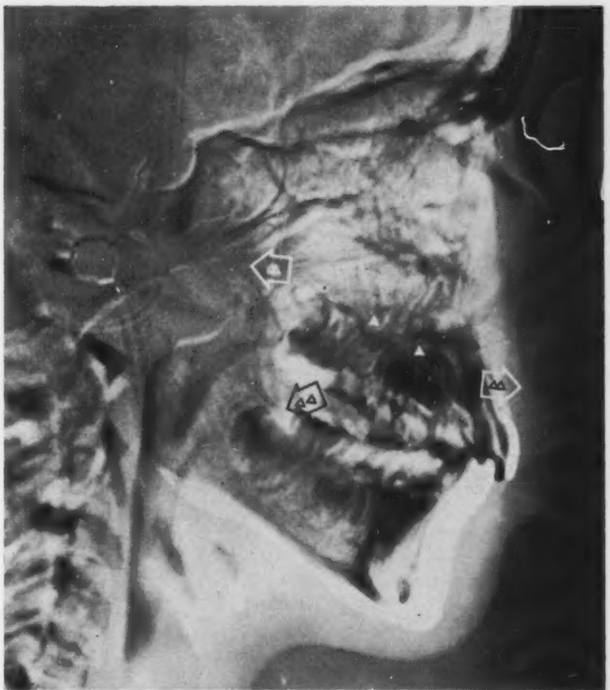
Each of the successive superimpositions shows combined changes due to growth and treatment *in relation to the area of exact superimposition.* The area of exact superimposition is identified by solid triangles. Changes at specific points are marked by the tops of the open triangles, with direction of change shown by the arrows.

A, Positive and negative superimposed on the "anterior cranial base" area. Growth in relation to this area has moved sella posteriorly and nasion anteriorly. The upper incisor edges have moved straight down, while the chin has moved downward and forward.

B, Superimposition on the "posterior cranial base" in the area of foramen magnum. The change at sella is upward and forward. In the maxilla, the change is anterior and slightly downward. The chin has moved downward and anteriorly, but the anterior shift at the ramus is suggestive of some anterior posturing of the mandible.

(Continued on opposite page.)

C.



D.

Fig. 1 (Cont'd).—*C*, Superimposition on the middle palate and floor of the nose. From this reference area, the upper incisors have moved horizontally forward and the molars have moved downward and posteriorly. Note the large change in the second molars due to eruption. There is a small posterior change, due to maxillary growth, at the pterygomaxillary fissure.

D, Superimposition on the mandibular ramus. This registration reflects all growth of the body of the mandible at the chin. The small amount of growth, compared to the changes at the chin in *A* and *B*, confirms the presence of some anterior posturing of the mandible.

that the right and left sides cannot be superimposed at the same time. This is not ordinarily desirable, but it is possible to utilize the effect for detailed unilateral evaluations by making two radiographs with an intentional stereo shift rotation of the head between exposures.

Another effect which will be encountered as soon as this method is applied to an actual case is the occurrence of areas in which the films are not sharp enough to permit a clear-cut interpretation. This can be especially disappointing when it appears in an area where we have become accustomed to the fine, sharp line of the tracing, but elimination of these false illusions of accuracy can ultimately lead to more reliable conclusions. When this technique is used carefully, many of these areas of doubt can be successfully resolved, augmenting our understanding of the complexities of growth and treatment.

It is suggested that superimpositions normally be carried out with the positive from the earlier film and the negative (radiograph) from the later film. With this procedure, the negative will always have the larger image, since growth will be most advanced at the later date. This keeps the black background of the negative in front of the profiles of both films. Using this combination also speeds serial evaluations, since the positive of the earlier film can be prepared in advance for use as soon as the latest radiograph has been processed.

Film quality should be well controlled for best results with superimposition. Positive and negative should be similar in density (blackness) and contrast, so that they come close to cancelling out when they are superimposed. If one film is very dark and the other very light, the darker picture will overwhelm the lighter one and make comparisons difficult or impossible. Viewing is difficult if both films are very dark, and details will wash out if they are excessively light. In special cases which justify the added effort, many unsatisfactory radiographs can be reproduced by the same technique as that used to make the positives, and their diagnostic quality can be improved by use of the controls which the method provides.

ADDITIONAL TECHNIQUES AND APPLICATIONS

In addition to providing a substitute for the tracing and a medium for serial evaluation, the basic method of duplication used here can be applied or modified in other ways. A few of these are listed here:

1. A duplicate negative similar to the original radiograph can be made from the positive by repeating the same procedure. This gives a measure of control over contrast and density which can actually enhance the diagnostic quality of the duplicate, especially in areas which are extremely dark on the original film.
2. Dodging, such as that used in photographic enlarging, can be employed to vary the exposure in selected areas. This is especially useful for bringing out the soft-tissue profile.
3. Positives or duplicate negatives can be made on a wide variety of materials in addition to the matte film:

(a) Clear photographic sheet film (commercial, Kodalith, or other) for projection in an overhead projector or other application. These films have a crystal-clear base which is much more transparent than x-ray film.
(b) Enlarging paper, which is available in a wide variety of textures and contrasts.
(c) White plastic base film (Cronapaque), which lies flat, has exceptional dimensional stability, and can be viewed like a paper print or transilluminated.

4. Results of superimposition can be recorded and demonstrated by placing the two superimposed films in a larger printing frame and making another reproduction on film or paper. This was the method used to make Figs. 1 and 2.

Fig. 2.—Positive and negative of profile superimposed to show treatment changes.

MAKING THE POSITIVE

Positive translucencies are made by almost the same method as that used to make ordinary black-and-white snapshot prints. The process requires about

the same amount of time as the exposure and processing of a radiograph, and it is very suitable for delegation to auxiliary personnel.

The process will be described here in detail, in the normal order of procedure. Since each step anticipates the next, it may be necessary for the nonphotographer to read ahead in order fully to understand the reasons for some steps. All necessary details are included, however, so that no previous knowledge beyond a familiarity with x-ray processing is required.

The procedure has been developed for the consistent reliability required for successful application in a busy office or institution. Positives should equal or surpass the original radiographs in consistent diagnostic quality. A skilled photographer might like to try short cuts or variations from this method. There are many such changes which could be successfully adopted, but these should be undertaken only with a full understanding of the principles and techniques involved and preferably after the operator has developed a familiarity with the technique as described here.

Step 1. Determination of Correct Exposure.—The first step in making a positive translucency is to measure film density in a specific part of the picture and read the correct exposure time from a dial calculator.

Accurate exposure is essential for consistent results of good diagnostic quality. As might be expected, overexposure or underexposure will produce excessively dark or light translucencies. What might not be expected is the tremendous range of exposure encountered in working with ordinary radiographs. Comparable areas of different films may differ more than 100 times in light transmission, and the exposure of the positives must be adjusted to compensate for these differences.

To provide this compensation consistently, it is necessary to measure the light-transmission properties of each radiograph. This could be done in many different ways, but for a rapid, accurate, and foolproof technique, the densitometer is the instrument of choice.

A densitometer is a specialized instrument for the measurement of photographic density (blackness). It is widely used in color photography and other specialized fields, and a simple mass-produced model is now available through most photographic equipment dealers.*

When this instrument is used for exposure control, the density must always be measured in the same part of the picture, which will be referred to as the exposure-control area. Any area could be selected for this purpose, but it is suggested that in the beginning these measurements be made in the upper lip, just anterior to the incisor root, or in the black background in front of the face. Exposure is adjusted to reproduce the selected area as a very light shade of gray and thus ensure reproduction of all bony details in the nasal spine area, even from overexposed radiographs.

Any structure of reasonably consistent radiopacity, such as teeth, pharyngeal airway, or even parts of the cephalostat, can be used as the exposure-control area. The important point is that the exposure-control area and other areas

*Eastman color densitometer, Model D-1.

of the same density will be reproduced most consistently, always in the same shade of gray. Only variations in processing can cause variations in reproduction of this area.

When the exposure-control area has been selected, a density measurement is made in that area on a typical film. Several positives are then made from this film, with the exposure being adjusted by trial and error until the optimum exposure has been determined. Special attention should be given to attaining good rendition of the exposure-control area.

With the density of the control area and the optimum exposure for this film, the dial calculator* can be set to provide the correct exposure time for all succeeding films directly from their density readings.

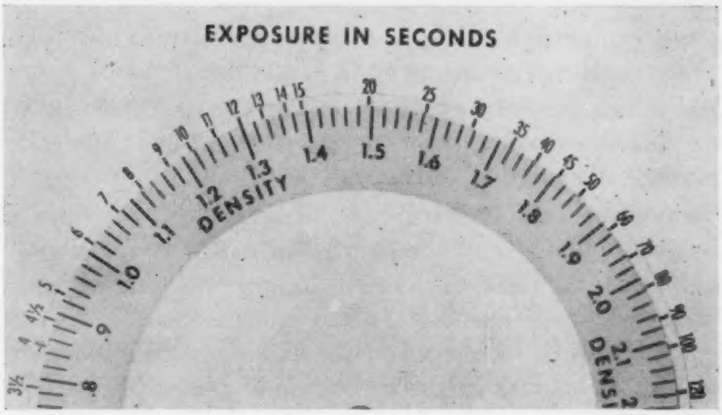


Fig. 3.—Part of dial calculator used to determine exposure. Exposure time is found opposite the density of the exposure-control area of the film. In this case, density 1.3 requires an exposure of 12 seconds, while density 2.1 requires 98 seconds. These figures and this dial setting are for illustration purposes only; dials of the calculator must be set for each installation, as described in the text.

In the dial calculator shown in Fig. 3, the outermost scale is calibrated in exposure time in seconds. The adjacent scale, on the rotating inner dial, is calibrated in density values. This dial is rotated to place the density and the correct exposure time for the test film (positive) opposite one another. With the dial in this position, correct exposure time for any other film can be found directly opposite its density value. For example, with the dial set as in Fig. 3, a density of 1.22 requires a ten-second exposure, and a density of 1.8 requires an exposure of forty-five seconds. These values from Fig. 3 are for illustration purposes only; in actual practice, the dials of the calculator must be set as described above under the actual exposure and processing conditions that are to be used.

Once the correct dial setting has been determined from a test film, it can be used indefinitely without further adjustment. Changes are necessary only when there is some change in the conditions of exposure and processing.

Step 2. Exposure of Matte Film.—At this stage the radiograph and the unexposed matte film are placed together in a contact printing frame and exposed to light for the predetermined length of time.

*Kodak Dye Transfer Dataguide or similar calculator.

The radiograph is placed in tight contact with an unexposed sheet of matte film* in a contact printing frame. A contact printing frame is similar to an x-ray cassette, with the front made of glass instead of opaque material. If radiographs are of the 8 by 10 inch size, the printing frame and film can also be of this size; with 10 by 12 inch radiographs, it will be necessary to use an 11 by 14 inch printing frame.

The two films are placed in the frame so that light passing through the glass front must pass through the radiograph before it reaches the unexposed film.

Equally sharp positives will be obtained with any orientation of the radiograph in the frame, since x-ray film has duplicate images in emulsions coated on each side of the film. It will be best, however, to standardize the procedure by inserting the radiograph so that it appears in normal viewing position through the glass front of the frame.

Proper placement of the unexposed matte film is much more important, since only one side is coated with a sensitized emulsion. This side must face the light; otherwise, no picture will be produced.

To facilitate placement of the film, photographic sheet films are notched in such a way that the emulsion side can be identified in the dark. On one of the short sides of the film, near a corner, the edge is notched with a combination of U-shaped and V-shaped notches. These are combined in a distinctive code for each type of film, which is shown on the outside of the package. When the film is held with these notches on the right side of the upper edge (the position shown on the package), the emulsion side will be facing the viewer. The usual practice is to hold the film at this corner between the thumb and middle finger, with the index finger in position to check the notches.

An easier but less reliable way to identify the emulsion side of the film is by sight. The back of the film is coated with a bright red antihalation dye, which disappears in processing. Under Safelight illumination, it is often possible to differentiate between this bright glossy red and the dull gray-cream emulsion. If this method is used, care should be taken to avoid excessive exposure to the light of the Safelight.

When the unexposed film has been placed in the frame with its emulsion in contact with the radiograph, the back of the frame is closed and the frame is placed in position squarely facing the exposing light.

The exposing light can be any low-intensity light source. An ordinary 7½ watt night light, placed about 3 feet from the printing frame, is adequate. In mounting the exposing light, one should avoid shadows or reflections reaching the area where the printing frame will be placed. All light reaching the printing frame should come directly from the light source itself and fall uniformly on the frame.

The exposing light is turned on for the exact time indicated by the dial calculator. This is accomplished easily with the help of an automatic timer, such as an enlarger timer. These timers can be preset to turn the light on for

*Eastman Commercial Matte.

any period up to sixty seconds. They are usually equipped with an electric outlet, so that a cord from the exposing light can be plugged directly into the timer. If the required exposure time should be more than the maximum range of the timer, one can divide it into equal shorter intervals and use repeated exposures. When a series of positives are being exposed at one time, they can be arranged in order of increasing exposure time. During each exposure the timer can be set for the next exposure; the illumination from the exposing light will enable one to see the dial.

Care should be taken to protect all undeveloped films from light during this exposure. The exposing light is quite dim, but it can rapidly damage undeveloped films.

Step 3. Processing of Exposed Film.—Finally, the film is developed, rinsed, fixed, and washed the same as x-ray film.

Procedures following exposure are essentially the same as for x-ray films, but some modifications may prove advantageous.

The Safelight recommended for commercial matte film is not the same as that used for x-ray film, but most x-ray Safelights can be used. The Safelight can be tested for safety by placing a partly covered piece of film under it for at least one minute and processing it immediately with a minimum of additional exposure to the Safelight. If this film shows a difference between the covered and uncovered areas, the light is unsafe. In this situation, the operator should make the same test with the most sensitive x-ray film which he is using before changing the Safelight. If both films are affected by the light, the size of the bulb should be reduced or the light should be directed away from the work area and the light retested. If only one type of film is affected, one should change to a different filter and retest.

The film can be developed with standard x-ray solutions, but the developing time may be shortened for commercial matte film. Solutions and methods vary widely, so that no general recommendations can be made; however, developing time as short as one-half that used for x-ray film should be tried.

Rinsing, fixing, and washing are carried out the same as for x-ray film. X-ray or photographic fixing solutions may be used interchangeably for either film.

Adjusting Contrast.—A frequent problem with both radiographs and positives is excessive contrast. This is characterized by a solid black background, burned-out soft tissue, and absence of detail in dense bony areas. Optimum contrast should give good detail in light areas with a density of only about 2.0 in the darkest areas.

Kilovoltage, x-ray filtration, and development all have an effect on contrast. If it seems desirable to reduce contrast, all of these effects should be considered. Increasing kilovoltage will reduce contrast, so one should be sure that the machine is operating at maximum kilovoltage before making any other change. Considerable reduction can also be achieved by the use of copper filters in the x-ray beam,[2] especially with low-kilovoltage (55 to 70) machines. One to three thicknesses of 0.125 mm. (0.005 inch) copper, with at least 0.5 mm. of

aluminum in front, will bring about a very noticeable reduction in contrast. This additional filtration removes most of the soft low-voltage radiation, so that an increase in exposure time is required. However, the intensity of radiation in the beam is reduced so greatly by the filters that much less total radiation reaches the patient, even with the longer exposure time.

The remaining means of contrast control is modification of film development. In the developer, an x-ray film behaves in the same manner as any other photographic film; the nature of the radiation used to activate it makes no difference at this point. This means that the methods used to control contrast in photography may be used in radiography also.

The basic factors in development which can affect contrast are the developing agent, alkalinity of the solution, concentration of the solution, temperature, and developing time. Many different developing agents are in use, each with its own contrast characteristics. Increasing any of the remaining factors will increase contrast, while decreasing any of them will reduce contrast. The only one of these which should not be modified is the developing temperature, which should be held constant at the optimum 68° F.

The developer can be diluted with water at least 1:1 (more with some solutions) to gain some reduction in contrast. By photographic standards, x-ray developers are very high-contrast developers, and additional reduction is best obtained by means of an entirely different type of developer. This simultaneously brings concentration, alkalinity, and choice of developing agent into the picture. An excellent choice for lower contrast is DK-50, diluted 1:1. This developer is frequently used in commercial and portrait photography.

When any change in developer is made, it will usually be best to make the same change for both positives and radiographs. This is not only more convenient than using two different developers, but it will help to keep the films similar in contrast characteristics.

DK-50, diluted 1:1, will accomplish a marked reduction in contrast of both radiographs and positives, with no loss in effective film speed in the radiopaque areas where speed is important. Because contrast is lower, density of the darker areas is reduced. This gives the impression of a lower film speed, but there is no loss of details or of speed with this change of developer. Developing time with diluted DK-50 can be adjusted between eight minutes and fifteen minutes for x-ray film and between five minutes and eight minutes for commercial matte.

This developer is a low-concentration solution, so it is rapidly exhausted. For uniform results it should be replenished with DK-50R, as directed on the package, after every batch of films.

The foregoing suggestions are for guidance only. They should give good results, well worth the effort, but they can be modified in many ways to suit individual situations.

EQUIPMENT AND SUPPLIES FOR MAKING POSITIVE TRANSLUCENCIES

The following is a check list of equipment and supplies that are needed for the making of positive translucencies. (All of these items are available through amateur photographic supply sources, unless otherwise noted.)

Densitometer. Eastman densitometer Model D-1, or any other densitometer.

Exposure computer. Kodak Dye Transfer Dataguide or other calculator for converting density values to exposure time.

Printing frame. Contact printing frame large enough to accommodate films.

Timer. Enlarging timer or other timer which will turn off an electrical device at the end of a preset time. Time range, approximately one minute.

Exposing light. This can be a simple night light with a 7½ watt bulb, available at hardware and variety stores. An extension cord will be required to connect this light to the timer.

Film. Kodak Commercial Matte film (*not* Commercial film, which has the same emulsion on a clear base). Not all photographic supply dealers are authorized to sell this film in the 8 by 10 inch size, but they should be able to furnish the name of the nearest distributor.

Developer. Optional replacement for x-ray developer is Kodak developer DK-50. This requires the use of a replenisher, DK-50R.

SUMMARY

A method for replacing the cephalometric tracing with a positive photographic reproduction on matte film has been presented.

This positive retains all the advantages of the tracing, with greater accuracy and detail and fewer demands on the investigator's time. In addition, the positive makes possible a new and more productive approach to serial cephalometric evaluations.

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2. Yale, Seymour H., and Goodman, Leonard S.: Reduction of Radiation Output of the Standard Dental X-ray Machine Using Copper for External Filtration, J. Am. Dent. A. **54**: 354-357, 1957.

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VARIATIONS OF THE BEGG TECHNIQUE

A Preliminary Report

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INTRODUCTION

ORTHODONTICS is a field in which philosophies of treatment and mechanical techniques vary widely. Opinions differ as to the optimum time for beginning active appliance therapy, the types of appliances to be used, the necessity for extraction, etc. This is not necessarily a weakness; indeed, it can be a source of strength, producing flexibility and adaptability. Treatment that is applicable in one case may be varied to meet the conditions presented in a different case. For example, four-unit extraction and multiple banding may be the answer when the patient is a cooperative, healthy seventh-grader, but in the case of a dull, antisocial tenth-grader this exacting technique may have to be compromised.

Not only techniques but also whole philosophies of treatment may have to be altered when the underlying economic structure of a country differs from that of the United States. In our relatively wealthy society, individual and idealistic attention to each patient is still possible. In socialized nations, orthodontists must face the problem of treating all who present themselves for treatment. Of necessity, these men must utilize the least time-consuming methods feasible.

As indicated, the aspects of orthodontics are legion. It is up to the individual orthodontist to consolidate and correlate these aspects. I like to think that the lifelong process involved in the development of an orthodontist might be summarized in one word—*integration*. The orthodontist, as the center of the procedure, is the integrator of a multitude of facts; from that integration comes the art of orthodontics.

In recent years Begg[1, 2] has added a new concept of treatment to the orthodontist's armamentarium. The purpose of this article is to describe some mechanical variations of Begg's appliance technique which I am using in my practice. I do not present this as a philosophy of treatment to the exclusion of all others. Rather, it is intended as another component to be integrated with the large accumulation of orthodontic information.

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

THE BEGG TECHNIQUE

The original concept of this treatment method is explained ably and in detail by P. R. Begg of Adelaide, South Australia, in two articles published in the AMERICAN JOURNAL OF ORTHODONTICS.

The purpose of the first article, "Stone Age Man's Dentition," is stated as follows:

> . . . first, to present a concept of anatomically correct occlusion that is at variance with the accepted view of this subject and, second, to outline a technique of orthodontic treatment based on, and justified by, the principles involved in a rational consideration of this correct occlusion and the etiology of malocclusion thus revealed.

Begg's second article, entitled "Differential Force in Orthodontic Treatment," amplifies and clarifies his technique. In his introduction, Begg makes the following statement:

> The purpose of this article is to describe a technique for the application of optimum forces for tooth movement by using a single round stainless steel arch wire 0.016 inch, and even less, in diameter.
>
> Although this technique has not previously been described in detail, it has been well tried and proved, as several thousand patients have already been treated with it. All required tooth movements—bodily, torquing, and tipping—can be performed with this technique. As far as I am aware, it has not been possible hitherto to obtain efficient universal tooth movement with any form of arch wire other than rectangular. I also hope to make clear that the use of thin round steel arch wire raises the standard of results, as it eliminates the excessively high forces that are exerted by rectangular arch wire. Active treatment time is greatly reduced, but this technique is not presented primarily because it greatly reduces treatment time. Nevertheless, it is a fortunate coincidence that the orthodontic force values that are used cause least discomfort to patients, least loosening of teeth, and least damage to tooth-investing tissues, while at the same time they are also the forces that move teeth the most rapidly and are the most easily controlled forces.
>
> The number of appointments for each patient and the duration of each appointment are so reduced that treatment of over 200 patients is completed each year.

The technique as outlined by Begg sounds like a combination of the light optimum forces delivered by the Johnson twin-wire procedure and the control obtained by the use of an edgewise technique. In retrospect, from my experience with these light wires, that is just what it is.

A brief résumé of the mechanics of this procedure is now in order. Primarily, the Begg technique is aimed at cases in which extraction is considered necessary. Into a round 0.016 inch stainless steel arch wire are bent vertical expansion or contraction loops (Fig. 1). These loops are located interproximally to each of the rotated anterior teeth. The anterior teeth are banded with ribbon arch brackets. Intermaxillary hooks are bent into the thin arch wire mesial to the right and left canine bracket locations. While keeping the occlusal plane level, the vertical loops are expanded. When the wire is locked into place with the canine hooks against the mesial aspect of the canine brackets, a gentle separating force is exerted. This action is similar to that of an expanded anterior coil spring confined in the same space. With the vertical loops, however, it is possible to engage the lateral and central incisors at the same time—a maneuver that tends to inhibit the action of a coil spring. As

the canines separate, aided by the judicious use of elastics to the molar teeth, the central and lateral incisors move and rotate into an even alignment. The rotation is caused by the spring inherent in the vertical loops when they are engaged in the ribbon arch brackets. Since all the anterior teeth are actively engaged while the rotation and alignment are occurring, the occlusal level is maintained. Simultaneously, as is often necessary, the same procedure may be carried out on the lower anterior teeth.

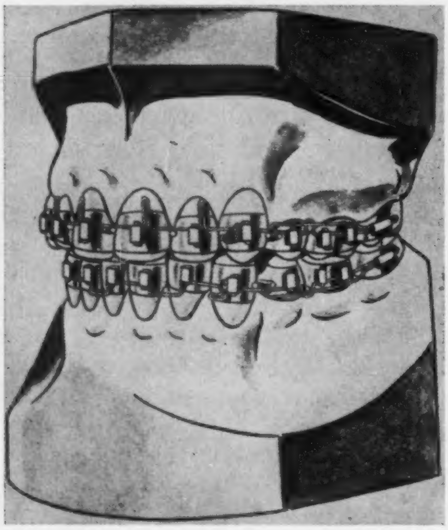


Fig. 1.

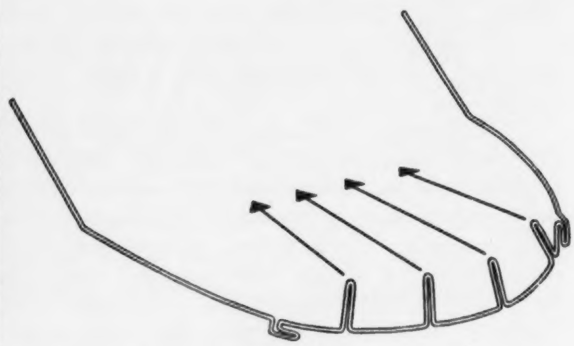


Fig. 2.

Fig. 1.—The Begg mechanism with ribbon arch brackets. (From Begg, P. R.: Differential Force in Orthodontic Treatment, AM. J. ORTHODONTICS 42: 485, 1956.)

Fig. 2.—Vertical arch spurs. (From Begg, P. R.: Differential Force in Orthodontic Treatment, AM. J. ORTHODONTICS 42: 489, 1956.)

If, after this rather smooth and rapid alignment of the anterior teeth, there is still space posterior to the canines to be closed, intramaxillary and intramandibular elastics are continued. Begg[2] discusses in detail the use of elastics for closure of extraction spaces. If, however, after the anterior alignment has occurred, space remains and the anterior teeth are extremely vertical to the occlusion, a new 0.016 inch arch wire is formed (Fig. 2). In this wire the loops are placed in such a manner that the tips of the loops press against the gingival aspects of the crowns of the teeth. When the arch wire is engaged in the brackets, there is a lingual torque action on the roots of the incisors. Just mesial to the molar tubes, marked distal bends are placed in both upper and lower arches ''for the purpose of moving . . . anterior teeth gingivally.'' Elastics are again employed to close the remaining space, but now the vertical arch spurs or loops keep the anterior teeth from tipping further vertically.

The advantages claimed for this technique may be summarized as follows:

1. All required tooth movements are possible.

2. A single light round arch wire effects the rotation and alignment of the anterior teeth; sometimes only one adjustment of the arch wire is necessary.

3. There is little strain placed on the posterior segment of the arch.
4. Treatment time is reduced (Fig. 3).
5. There is no compromise of accepted treatment objectives.

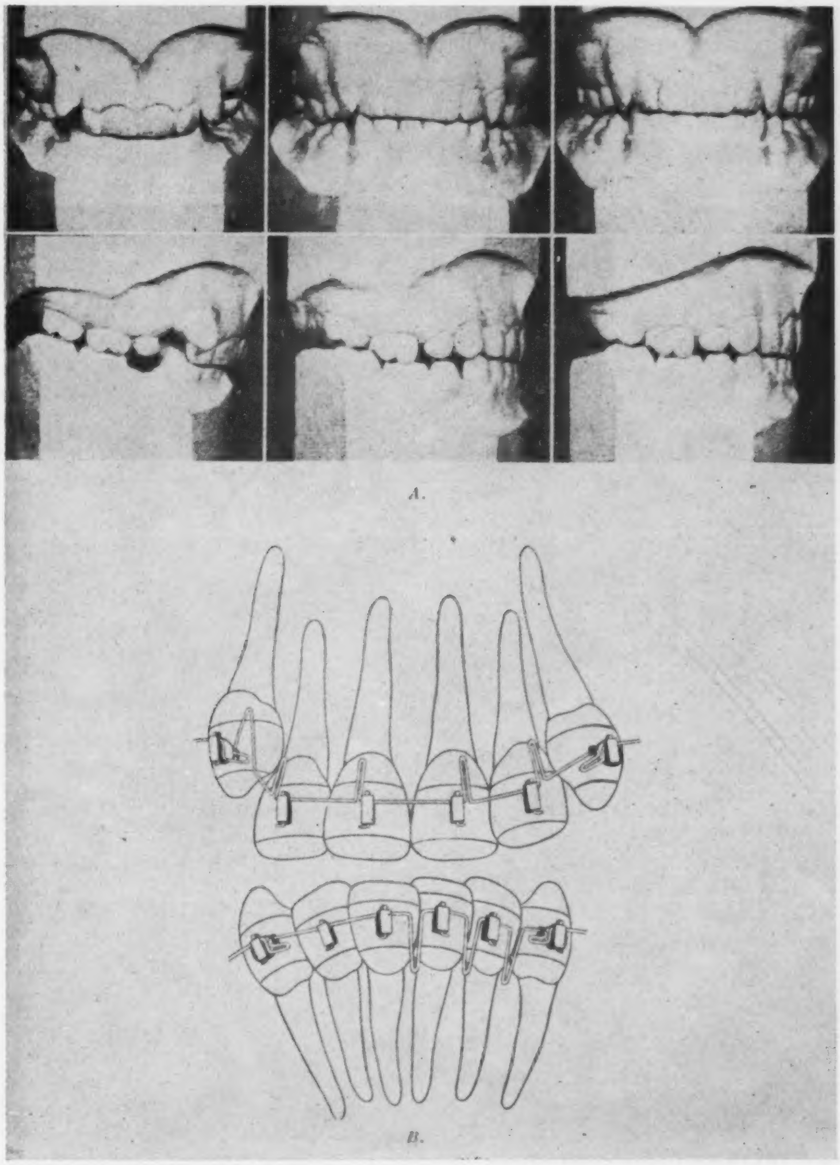


Fig. 3.—Case treated by Begg. (From Begg, P. R.: Differential Force in Orthodontic Treatment, Am. J. Orthodontics 42: 498, 1956.)

VARIATIONS OF THE BEGG TECHNIQUE

Substitution of the 0.10 Inch Double-Width Edgewise Bracket for the Ribbon Arch Bracket.—The possibilities of Begg's unique treatment method impressed me. However, in order to use this procedure in selected cases in my practice, it seemed advisable to circumvent the ribbon arch bracket. I decided

to try the 0.10 inch double-width edgewise bracket. I was using this bracket in most of the cases that I was treating by a multiple-band technique. Therefore, an easy transition could be accomplished in appropriate cases without rebracketing teeth already under treatment. If satisfactory results were not obtained, I could revert to my former method of treatment (primarily a sectional movement of teeth) or a rectangular edgewise wire could be employed at any stage of treatment.

Although the bracket is 0.10 inch wide, it is still possible to form the vertical arch spurs distal to the brackets of the central and lateral incisors

A. A.

B. B.

C. C.

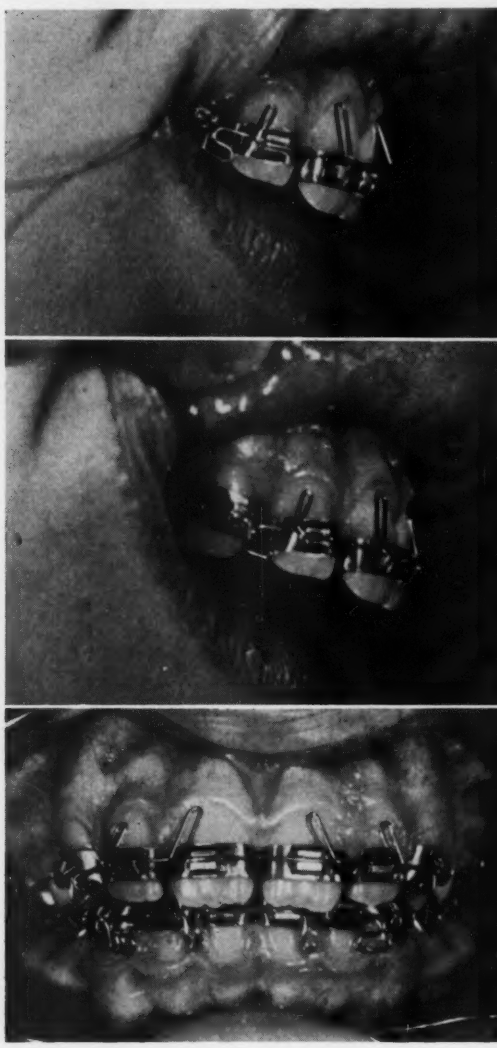


Fig. 4.

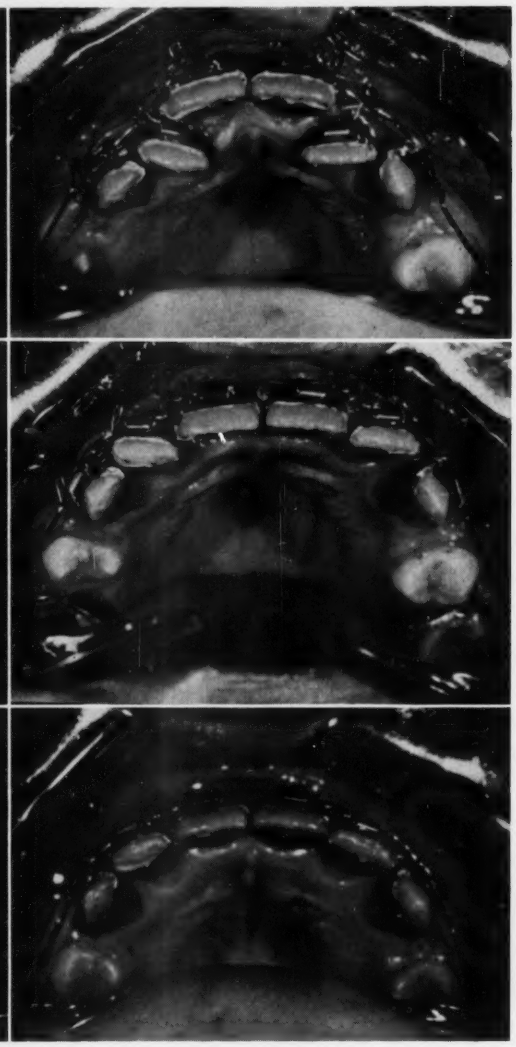


Fig. 5.

Fig. 4.—Vertical arch spurs with 0.10 inch double-width edgewise brackets. *A*, Position of arch spurs before tying. *B*, After tying. *C*, Front view; these arch spurs will create a distal pressure on the roots of the anterior teeth.

Fig. 5.—Rotational ability of 0.10 inch brackets with vertical loops. *A*, Arch wire (0.015 heat-treated Elgiloy) tied lightly, Oct. 14, 1958. *B*, Bracket engagement completed, Jan. 6, 1959; intramaxillary elastics and extraoral anchorage employed. *C*, Rotation effected, May 8, 1959.

and have the spurs engage the gingival aspects of the teeth (Fig. 4) as advocated by Begg. (A Siamese bracket was considered too wide to fit the arch spurs readily.)

The double-width bracket, like the ribbon arch bracket, has marked rotational abilities, without eyelets or rotational flanges, when activated by the vertical loops. As the horizontal part of the arch wire is tied into the bracket, a torsion action occurs in the area of the apex of the vertical loop. The action is very gentle and will work over a wide range without distorting or crimping the arch wire (Fig. 5). This lack of distortion results in fewer adjustments of the arch wire for rotations. If the loops are properly designed, only one arch wire is necessary for almost any rotation. In addition, the 0.10 inch double-width bracket aids in vertical root control in the movement of the buccal teeth in space closure.

Use of Additional Vertical Loops in the Posterior Section of the Arch Wire.—Begg advocates two methods for handling posterior segments. The first involves continuation of the 0.016 inch arch wire distal to the canine brackets with a marked distal bend mesial to the first molar (Fig. 2). This method of forming the arch wire is followed when the second premolar teeth are not banded. When they are banded, a second method is used; the arch wire is recurved to come back through the molar tube and again engage the arch wire mesial to the premolar teeth (Fig. 1). This method is appropriate for use with the ribbon arch bracket and a molar tube of the size advocated by Begg. It is not well adapted for use with the 0.10 inch bracket and the 0.022 by 0.028 inch molar tube.

In trying the 0.10 inch bracket and Begg's first method (a straight wire), I encountered much too much cuspal interference when the arch wire was placed. This resulted in adverse bending of the arch wire before the patient's next visit and necessitated removal and readjustment of the arch wire at each visit. This occlusal interference was, of course, a greater problem in the lower arch. Also if the second premolars were not incorporated in the appliance, the lack of root control was not satisfactory. This, too, was more pronounced in the lower arch.

To overcome these two problems—adverse bending of the thin arch wire in the buccal sections and lack of premolar root control—I placed the following loops in the arch wire: a vertical loop distal to the canine and a second smaller loop distal to the second premolar but as far mesially from the molar tube as possible (Fig. 6).

The engagement of the portion of the arch wire between these two vertical loops controls the premolar tooth, both rotationally and vertically. This is especially valuable in the mandibular arch. In the maxillary arch, whether the premolar is bracketed or not, it is advisable to place a vertical loop distal to the canine. This loop will permit a greater amount of movement of the arch wire without distortion. Therefore, fewer arch-wire adjustments will be needed to remove adverse bends in the wire in this area.

Actually, the outcome of this second variation is a continuation in the posterior section of the vertical loops used in the anterior section.

Formation of the Arch Wire on a Diagnostic Setup.—To facilitate construction of the numerous vertical loops, I had found it advisable to shape the arch wire on work models made after all of the bands had been placed. However,

A.

B.

C.

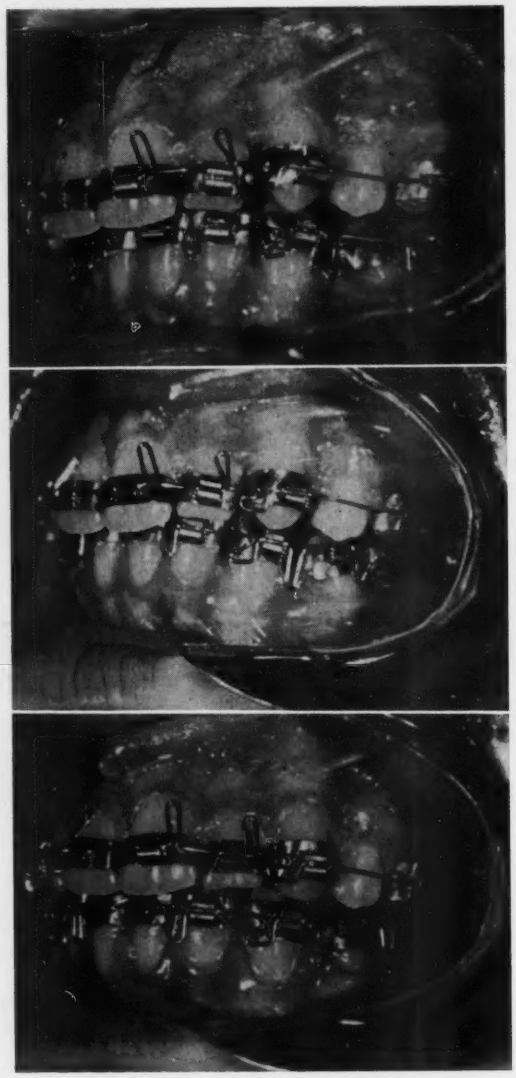
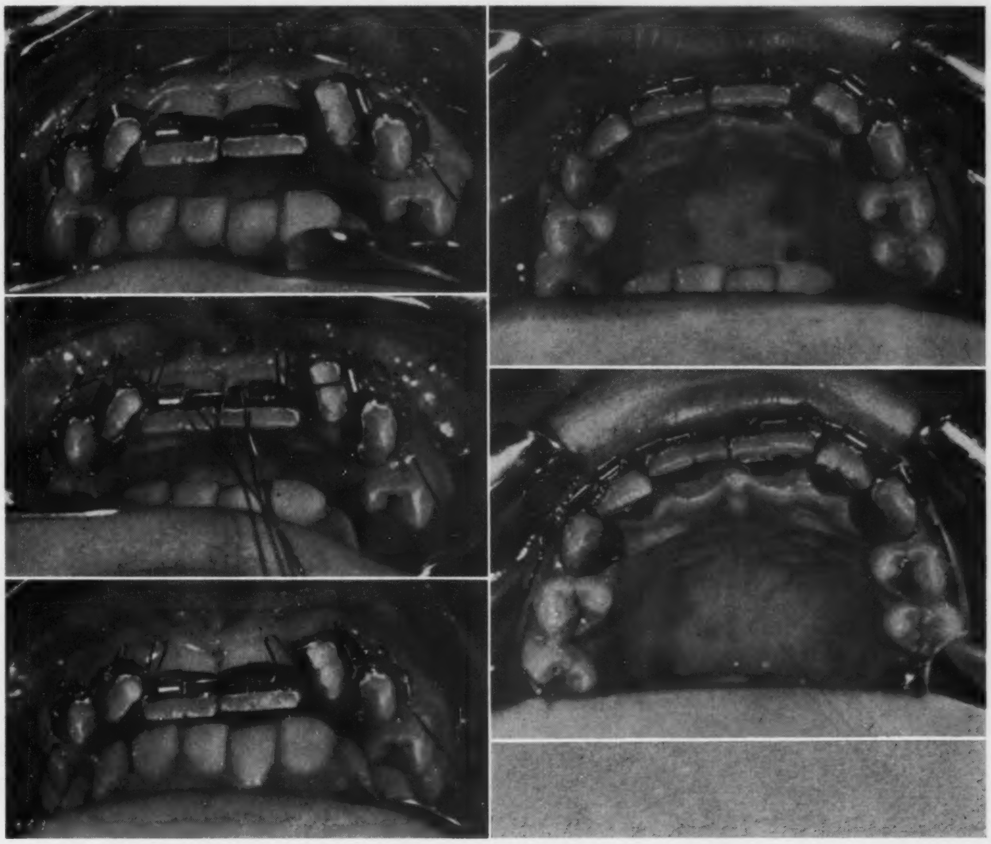


Fig. 6.—Vertical loops for premolar root control. *A*, Before engagement. *B*, After tying. *C*, Six months later; note arch spurs against upper anterior teeth and reduction of overjet.

when the arch wire is formed on a model with irregular teeth or in the patient's mouth, the mental image of the correct occlusion and of the recurved loops needed to achieve it is, at best, an educated guess. (The problem of shaping any arch wire and the optical illusions involved have been elucidated by MacEwan[3] in an article entitled "Some Illusory Phenomena of Importance in Orthodontics.") The effect of this procedure may be the necessity for corrective adjustments after the arch wire is placed in the mouth. Sometimes the

space being created between the canines is insufficient; at other times too much space may be obtained (Fig. 7). In the posterior section of the arch, the vertical loops may impinge on the molar tube before space closure is completed. It is difficult to compensate for unilateral discrepancies.

A. B. C.



D. E.

Fig. 7.—Rotation achieved with 0.012 inch arch wire. *A*, *B*, and *C*, Wire being tied into place for gentle rotation of anterior teeth, July 11, 1958; note expansion set in wire *(A)*. *D*, Rotation achieved by Sept. 30, 1958; at this time a 0.014 inch wire was inserted to close remaining space. (Note that, had the arch wire been formed on a diagnostic setup, this spacing might have been avoided.) *E*, Result obtained, March 11, 1959; use of a diagnostic setup would have precluded asymmetry of arch form and shortened treatment time.

At this juncture, the value of forming the arch wire on a diagnostic setup in which the teeth were already bracketed became apparent. A diagnostic setup provides the treatment objective—an ideal occlusion to be attained.[4] Begg's light resilient arch wire mechanism causes a smooth, direct, progressive movement of the teeth from the malocclusion to the correct occlusion. Forming the arch wire on the bracketed teeth of the ideal occlusion eliminates, to a great extent, the necessity for successive reshaping of the wire. Essentially, all of the physiologic advantages of tooth movement stimulated by optimum minimum forces are combined with the definite control provided by a tangible predetermined objective.

The arch wire is made on the diagnostic setup with the teeth already bracketed. Appropriate vertical loops needed to fit the malocclusion are

incorporated while the wire is being formed (Fig. 8*A*). When the wire is distorted to fit the irregularity of the teeth, it tends, along with the elastics being used, to move the teeth gently into the position of the diagnostic setup on which it was originally formed (Fig. 8*B*). If subsequent arch wires are needed,

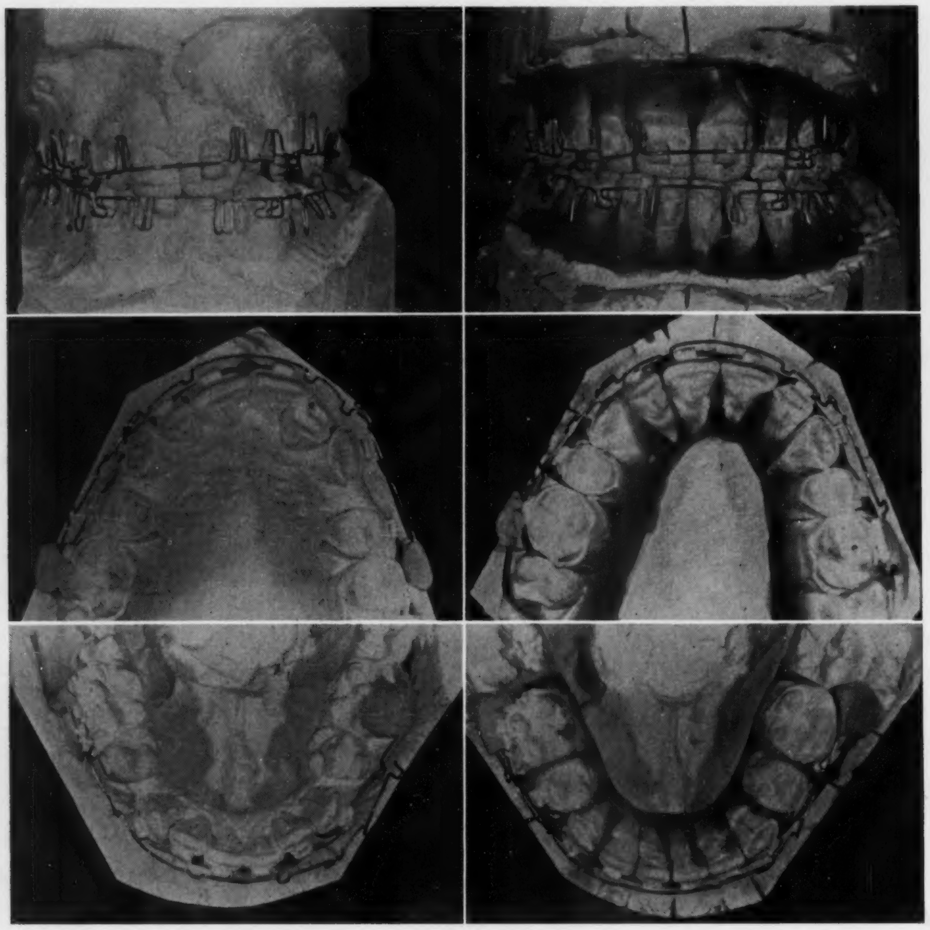


Fig. 8*A*.—Class I extraction case. Diagnostic setup with 0.015 inch arch wires. The arch wires were symmetrically formed on the diagnostic setup (right) with compensating vertical loops for the irregularity of the teeth (shown on the work models on the left). These same wires, formed on the diagnostic setup, were inserted for the action shown in Fig. 8*B*; then they were removed and replaced for the above photographs.

they also are formed on the same setup; thus, the movement of the teeth is continued evenly (Fig. 8*C*). As the case progresses, these new simplified arch wires can be made between office visits; further work models or extensive chair time will not be needed. The time thus saved more than justifies the use of the diagnostic setup. Primarily, however, the value of the setup is that it provides a concrete visual aid for the shaping of the wire.

TECHNICAL ASPECTS

On the last molar tooth to be banded, preferably the second molar, a 1/4 inch flat tube (0.022 by 0.028 inch) is attached in such a way that a "V" is

formed for the use of elastics. The rest of the teeth are banded with 0.10 inch brackets. No eyelets or rotational flanges are needed. In an extraction case, I usually band the molars and the canines before extraction. After the extractions are completed, the remaining teeth are banded.

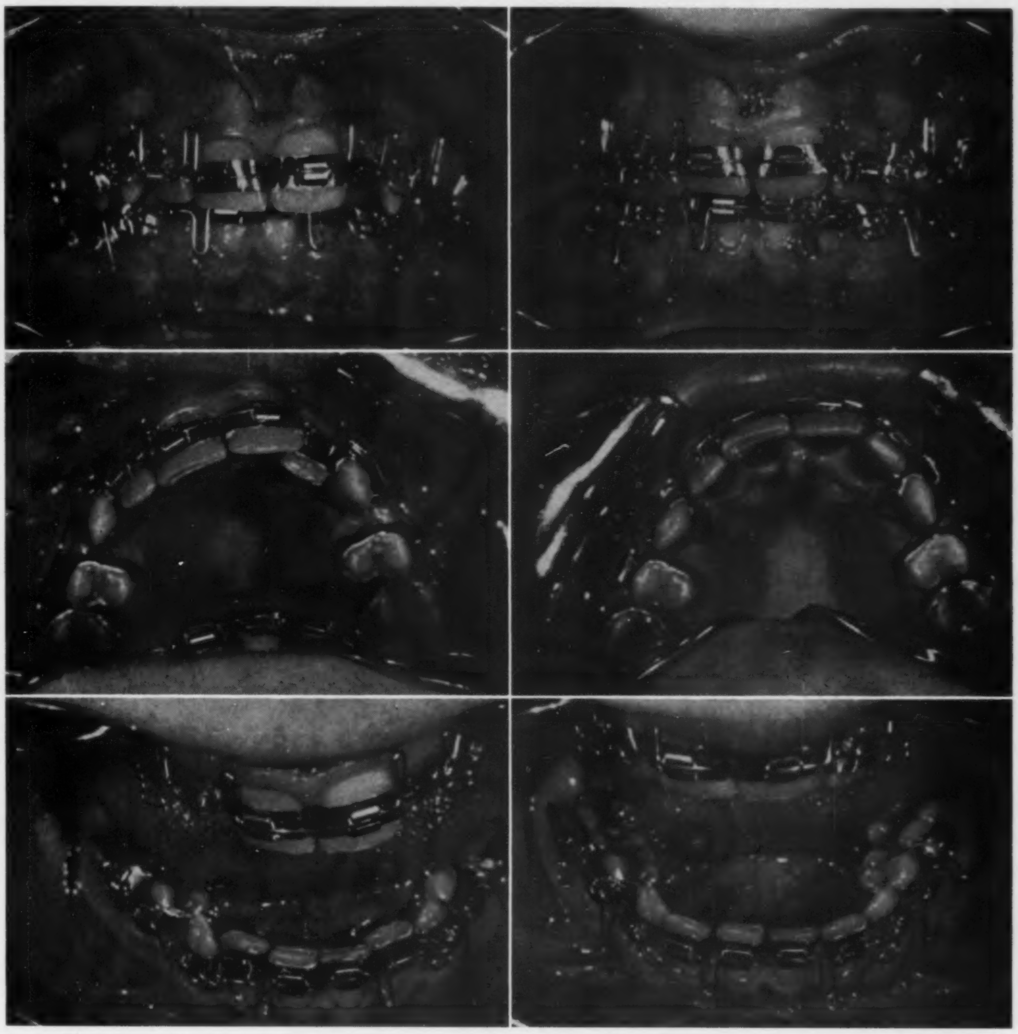


Fig. 8B.—Class I extraction case. Simultaneous action with 0.015 inch arch wires. The arch wires, shaped on the diagnostic setup (Fig. 8A), were inserted on March 27, 1959 (left). Neither wire was removed for any readjustment. The photographs on the right show the action which had occurred by Aug. 25, 1959.

Impressions are taken and poured twice—one for the work model and the other for the essential diagnostic setup. When the diagnostic setup is made, care must be taken to maintain the interproximal space of the teeth with their bands. When lower premolar brackets are in marked trauma, the bands are placed in the mouth for the impressions but cementing is delayed until the arch wires are inserted.

Although this is primarily a light wire technique, a wide range of wires—from a 0.012 inch stainless steel round wire to a rectangular wire—can be

employed. In treating extremely crowded arches or very sensitive children, I often begin with a 0.012 inch stainless steel wire with the recurved vertical loops (Fig. 9). After most of the irregularity is removed, a 0.015 inch yellow heat-treated Elgiloy wire is inserted (Fig. 10). Begg recommends a specially treated 0.016 inch (or smaller) stainless steel wire. With the Elgiloy wire, however, reserve benefits are gained. If a break in the wire occurs during treatment,

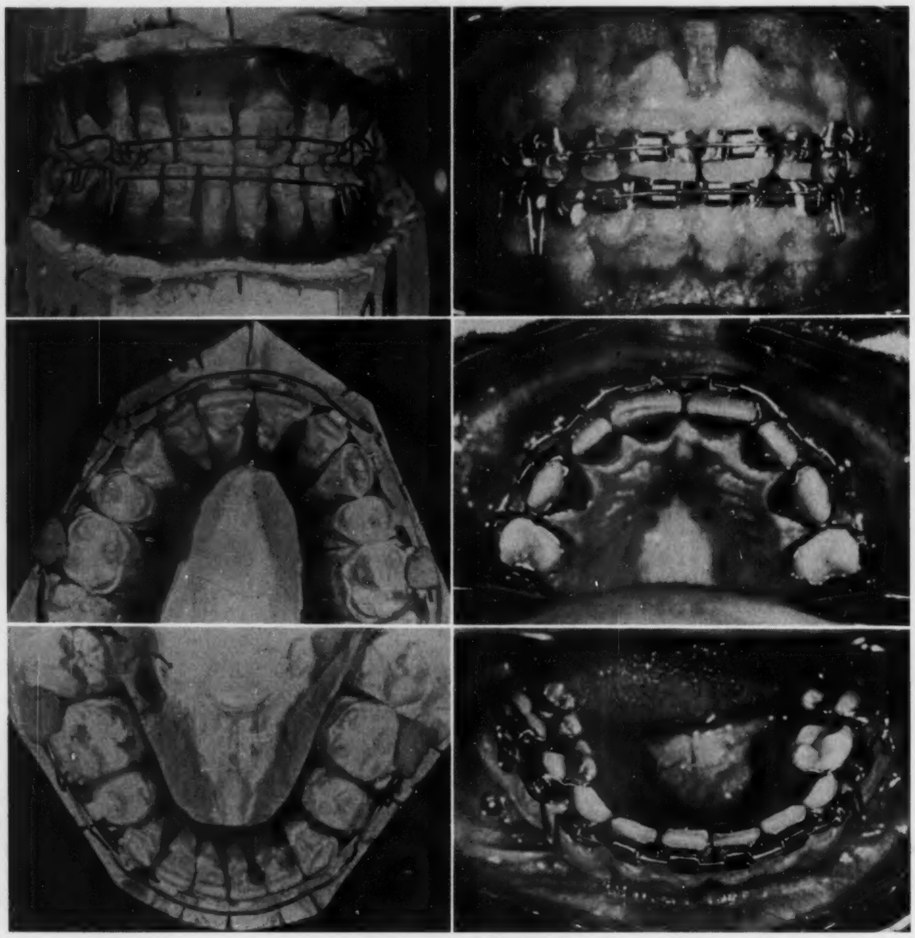
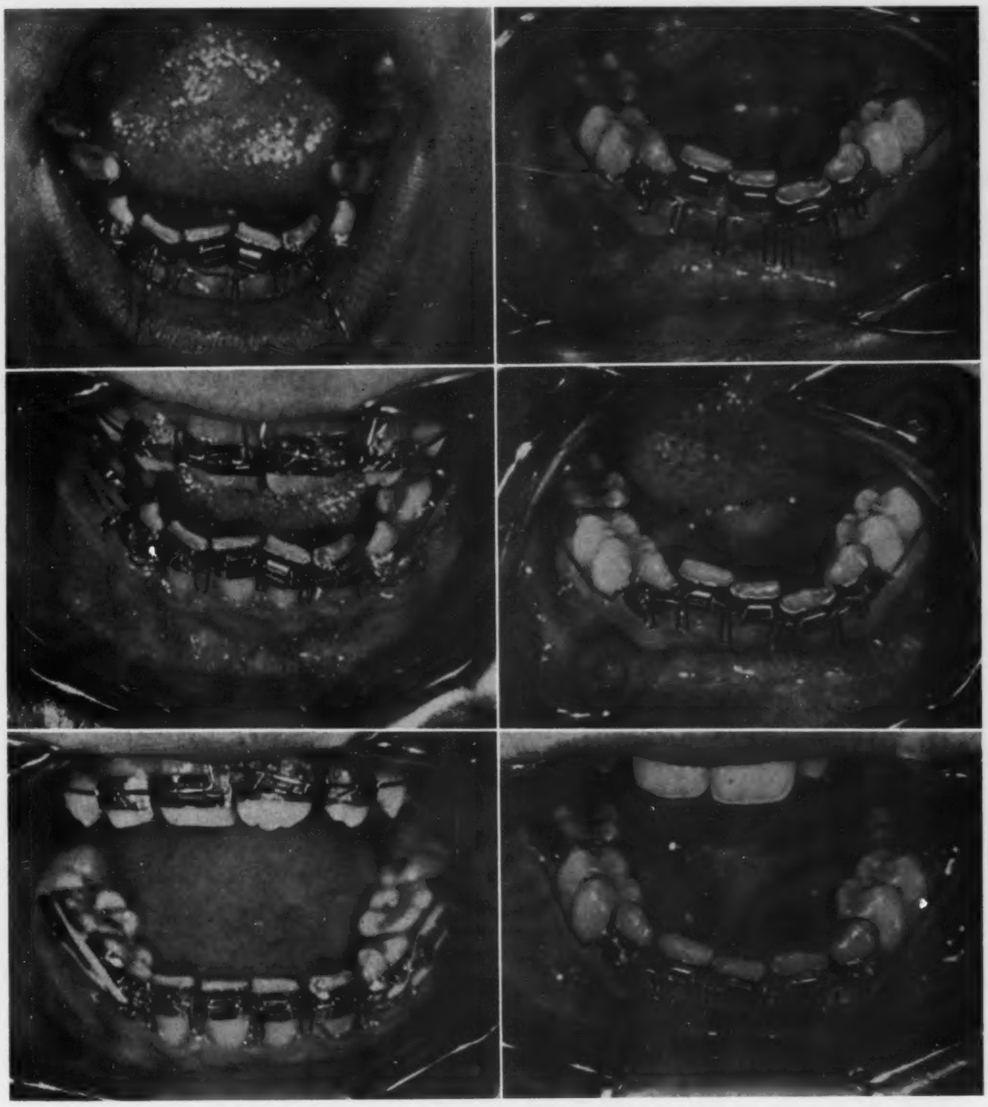


Fig. 8C.—Class I extraction case. Simply designed 0.016 inch arch wires. These wires, formed on the same diagnostic setup (left), evenly continue the movement of the teeth (right). Wires were inserted on Sept. 23, 1959. When necessary, vertical arch spurs or rectangular wires can be employed.

or if additional springs need to be attached to the wire (such as a spring wire to an adversely erupting second molar), soldering can be done. In fact, the heat applied hardens rather than softens the wire—an advantage not available with steel wires. Whatever the choice, extreme care must be taken not to strain the wire by bending it too rapidly or too sharply.

The wire is shaped first in a straight line, with the occlusal level kept on an even plane. I start vertical loops in the posterior section on one side by

studying the work model while forming the loops on the diagnostic setup. In fact, during formation of all of the arch wire, I engage in a constant interplay of measuring between the two models, remembering that the mouth with the malocclusion is the one in which the arch wire is to be placed. The more closely the wire is shaped to the ideal setup, however, the less readjustment will be neces-



A. A′.

B. B′.

C. C′.

Fig. 9.—Rotation achieved with 0.012 inch (left) and 0.014 inch (right) arch wires. *A* and *B*, Arch wires placed on June 17, 1958. *C*, Result obtained two months later (Aug. 19, 1958) with no adjustment. *A′* and *B′*, Arch wires placed on Sept. 6, 1958. *C′*, Result obtained by Jan. 10, 1959, with one removal.

sary. After the posterior vertical loops are formed on one side, the canine hook is bent into the wire on that side. More vertical loops are formed interproximal to the anterior teeth, the number of such loops depending upon the amount of rotation present. The other canine hook is formed, and vertical loops for the

other posterior section are made. The wire is then bent into arch form on the diagnostic setup. Care must be taken that the loops do not angle buccally, labially, or lingually to any great extent and that they are not too long (Fig. 11).

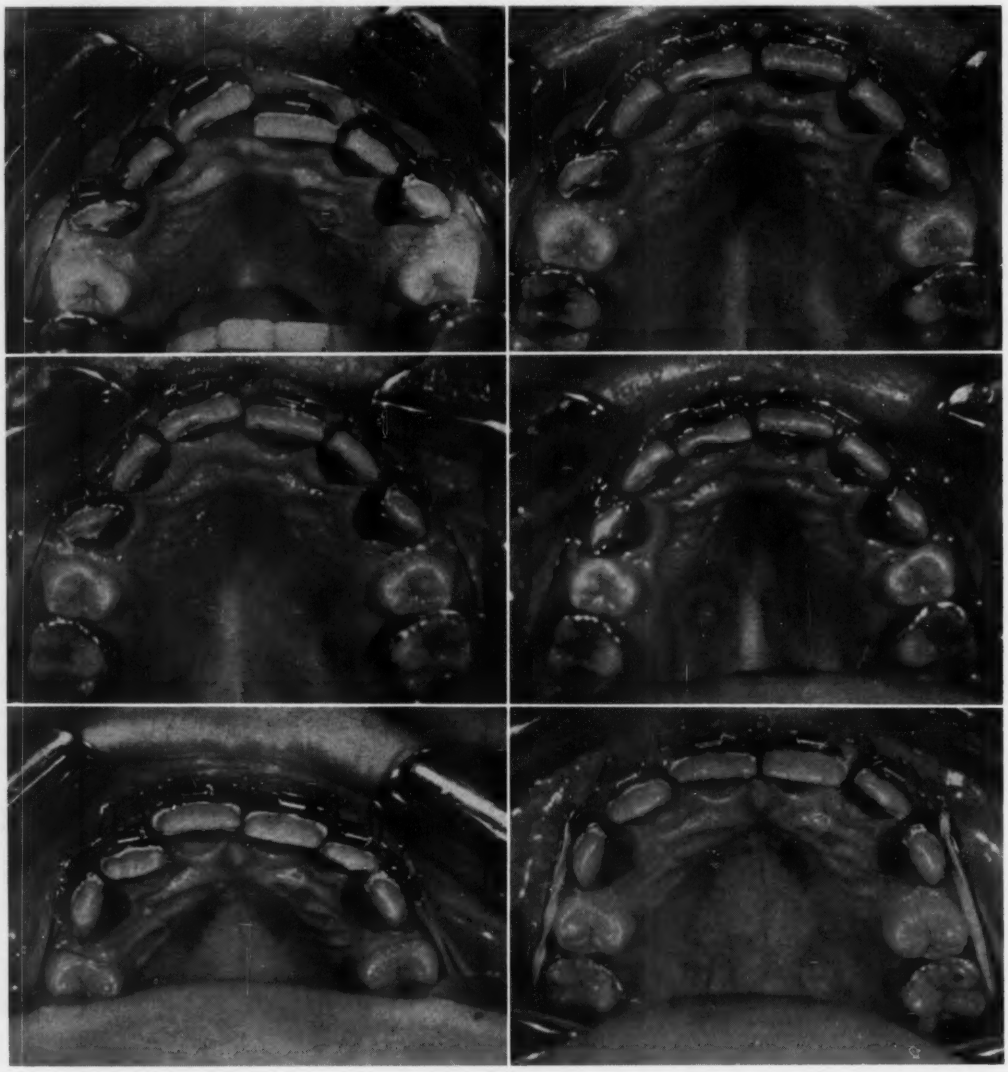


Fig. 10.—Rotation and space closure achieved with 0.015 inch Elgiloy wire. *A* and *B*, Wire placed on Nov. 29, 1958. *C*, Result with no readjustment, Jan. 16, 1959. *D*, New simplified 0.016 inch wire placed on April 8, 1959. *A′*, Wire placed on Sept. 3, 1958. *B′*, Result with no readjustment, Dec. 2, 1958.

Both upper and lower arch wires are inserted for simultaneous action on all of the teeth. If certain teeth, because of displacement, cannot be fully engaged at the first visit, they are engaged at subsequent visits. Intramaxillary, intramandibular, and Class II elastics are judiciously employed to close extraction space and correct Class II relationship (if present).

As the case progresses and the irregularity of the teeth is removed, more simply designed arch wires can be inserted (Figs. 12*A*, 12*B*, and 12*C*). Or,

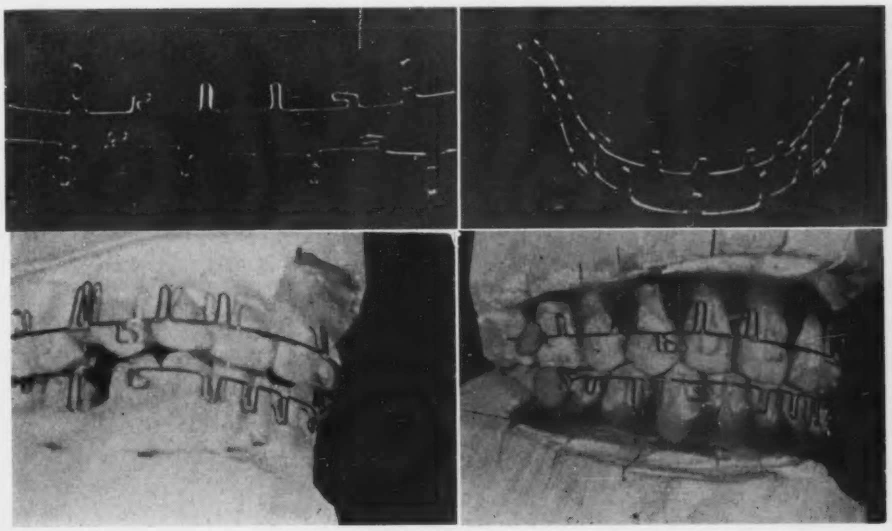
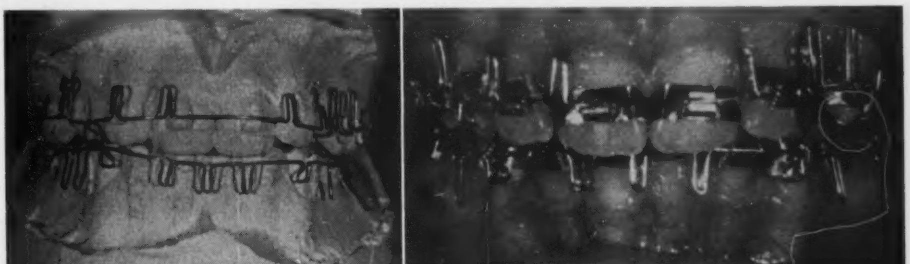


Fig. 11.—Construction of arch wires. The arch wire is formed in a straight line with as many loops as the work model of the malocclusion dictates. It is then bent into arch shape over the diagnostic setup.



a. *a′.*

b. *b′.*

c. *c′.*

Fig. 12*A*.—Class I extraction case with impacted canine. Occlusal adjustment, front view. *a* and *b*, 0.015 inch Elgiloy arch wires designed over work model and diagnostic setup. *a′*, Wires inserted on Dec. 6, 1958. *b′*, Result obtained by Sept. 19, 1959. *c*, 0.016 arch wires constructed over the same diagnostic setup. *c′*, Continuing space closure and alignment, Oct. 10, 1959.

if advisable, vertical arch spurs for anterior root control (as advocated by Begg) can be placed. These subsequent arch wires should be designed on the diagnostic setup and inserted at the appropriate time.

SALIENT POINTS OF APPLICATION

Extraction Cases.—

Class I and Class II: In Class I and Class II cases in which removal of units to gain arch space is required, space closure and the evenly controlled bilateral movement of the canines into the correct interdigitation are gentle and direct

a. a'.

b. b'.

c. c'.

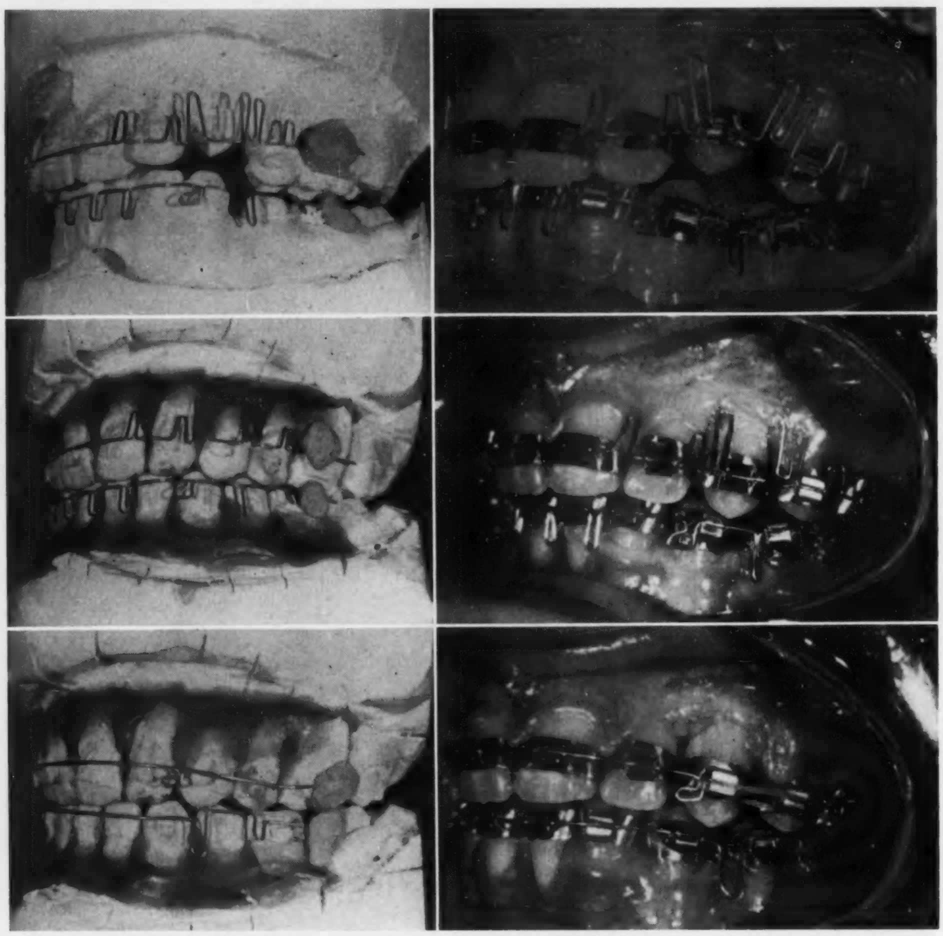


Fig. 12*B*.—Class I extraction case with impacted canine. Canine positioning, side view. *a'*, Photograph taken on March 2, 1959, three months after the arch wires were inserted (12*A*, *a'*); at this time complete bracket engagement was possible. *c'*, For further space closure, the vertical loop is expanded by tying at the molar; vertical arch spurs or a rectangular wire can be used if more root control is deemed advisable.

(Fig. 13*A*). The movement is the result of (1) the expansion present in the vertical loops placed between the canines to create space for rotation of the anterior teeth and (2) the action of elastics from the molar tubes to the canine hooks. Intramaxillary, intramandibular, and intermaxillary elastics are worn. The engagement of the posterior section of the arch wire with its vertical loops controls the premolar tooth after the arch wire slides through the molar sheath.

Since the arch wire is constructed on the diagnostic setup, impinging of the loops against the molar sheath should not occur. Nor should excessive space be created as the anterior teeth rotate (Fig. 13*B*). The rotation is carried out automatically along with occlusal leveling. Often the arch wire does not need to be removed for long periods of time, and then removal may be required only to ensure that no adverse bends have resulted from mastication. Sometimes one set of 0.015 inch arch wires will suffice to align both anterior and posterior

a. *a'.*
b. *b'.*
c. *c'.*

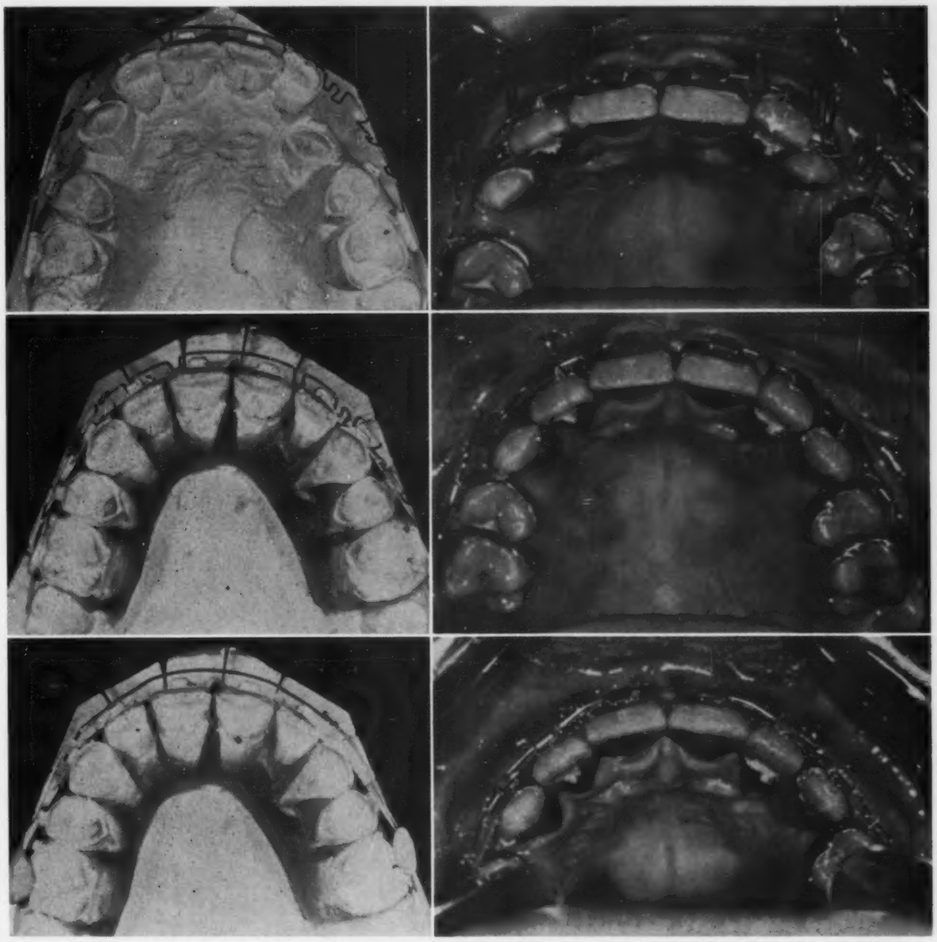


Fig. 12*C*.—Class I extraction case with impacted canine. Alignment and space closure, occlusal view. *a'* and *b'*, Note that the arch wire was not removed during this part of the treatment.

teeth and to close extraction space (Fig. 8*B*). A round wire of larger diameter, a rectangular wire, or a tooth positioner can then be employed to "finish" the case. In severe Class II cases, vertical arch spurs are placed to control the roots of the incisors. To gain maximum reduction of the anterior teeth, it is necessary to place marked distal axial bends in the posterior section of the arch wire. Elastics are continued.

Serial Extraction.—This multiple-band diagnostic setup—light wire technique lends itself admirably to the final active stage of treatment necessary in certain serial extraction cases. After the bands are fitted and the wires are

inserted, rotations, midline adjustment, canine interdigitation, paralleling of roots, and opening of the bite can occur quite rapidly. If one finishes cases with a positioner, he seems to be arranging for more work out of the mouth than in the mouth.

Nonextraction Cases.—

Class II, Division 1: In Class II, Division 1 cases in which extraction is not considered necessary, all of the teeth are bracketed and a diagnostic setup is made. On the mandibular model, vertical loops are usually needed between the

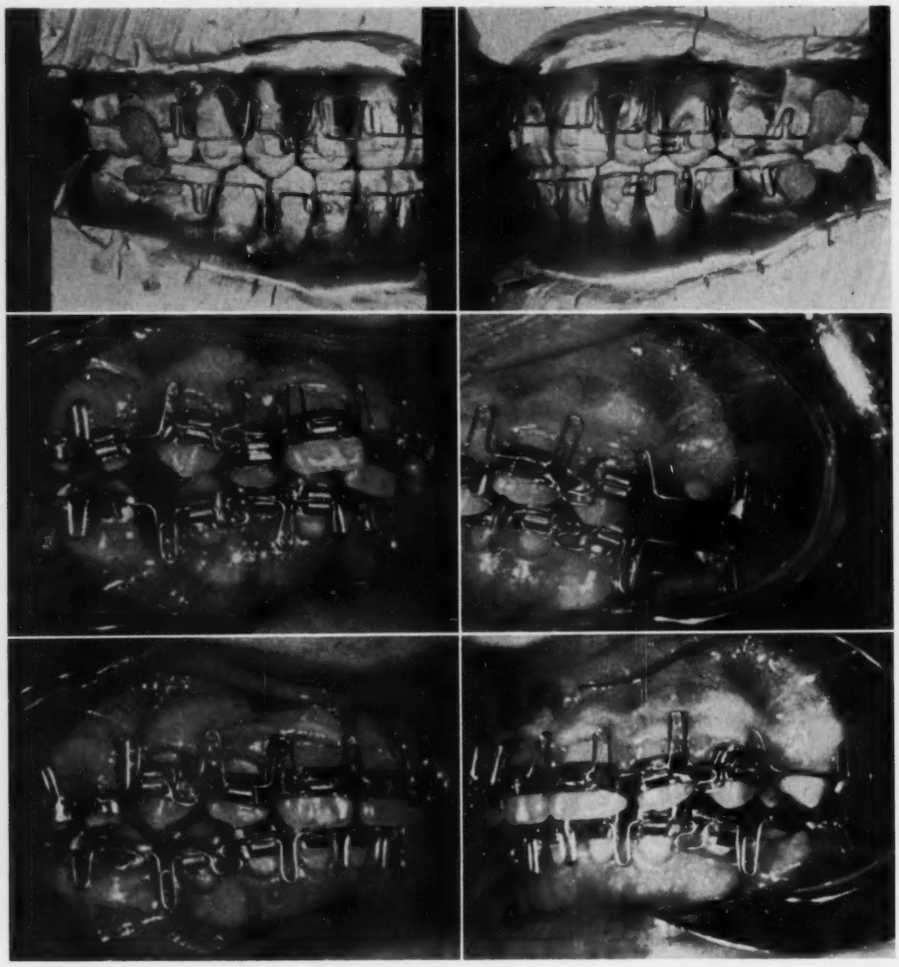


Fig. 13*A*.—Class I extraction case with unerupted second premolars. *Right:* The 0.015 inch Elgiloy arch wire is designed on the diagnostic setup so that correct canine relationship can occur at the same time space is maintained for the unerupted left second premolars. *Left:* While canine adjustment is occurring, the erupted right premolars can be controlled by appropriate vertical loops; simultaneously, the anterior teeth can be aligned.

molar and the second premolar and between the first premolar and the canine. On the maxillary model, vertical loops are needed between each premolar and the tooth next to it to effect the rotation often necessary for the premolars and to give distal axial tip-back bends to the premolar and molar teeth. Hooks for elastics are bent in the wire mesial to the canines. The round wire will allow

closure of incisor space. After a number of visits, if root control is necessary for the anterior teeth, a new arch wire with vertical arch spurs is constructed. Vertical loops will not be needed in the posterior section of this wire, for the rotation of the premolar teeth will have been completed. Class II elastics, of course, are used, and extraoral anchorage can be employed.

Class II, Division 2: The treatment of these cases is similar to that outlined for Class II, Division 1 cases, except that additional vertical loops are necessary in the anterior section. If a bite plane is used while the bands are being fitted,

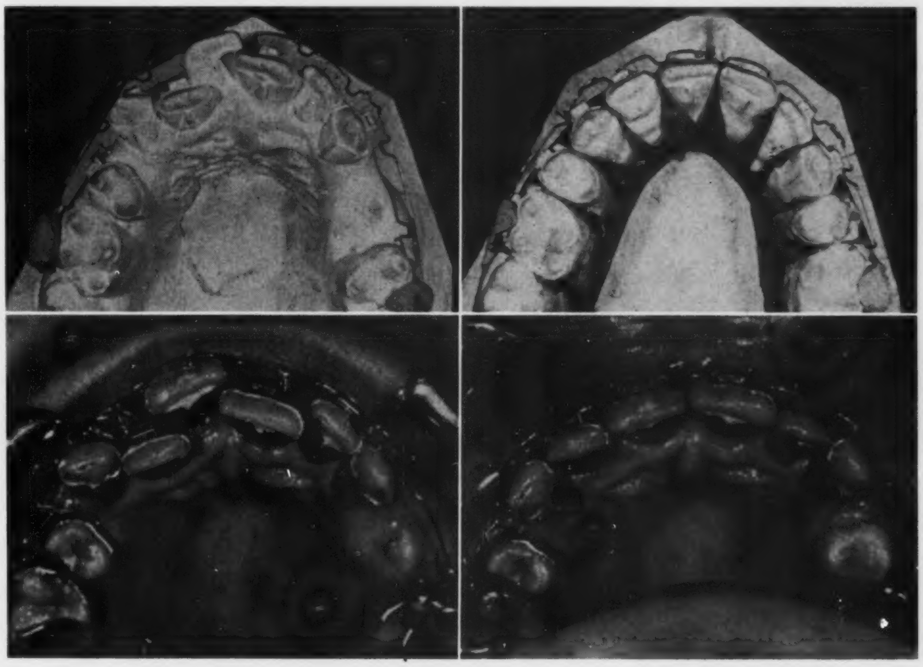
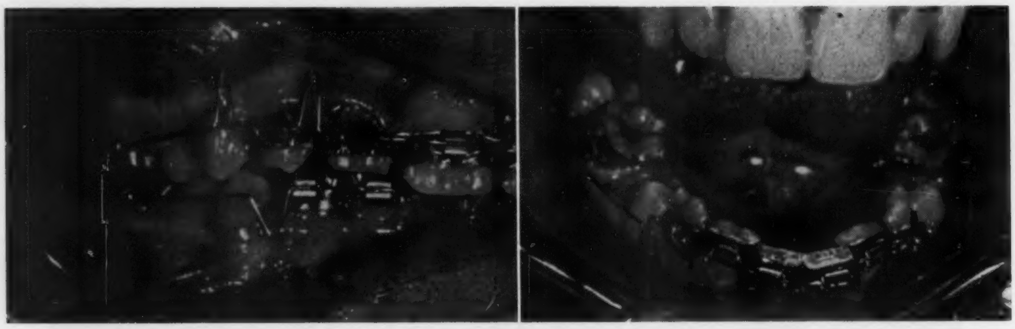


Fig. 13*B*.—Class I extraction case with unerupted second premolars. The arch wire designed on the diagnostic setup provides for symmetrical movement of the anterior teeth, even though the left second premolar is unerupted. Note that, by placing a second premolar on the left side of the diagnostic setup, provision can be made in the arch wire design to engage that premolar when it does erupt. This also applies in the lower arch. *Lower left:* Wires inserted on May 19, 1959. *Lower right:* Result obtained by Oct 2, 1959.

it is removed when the arch wires are inserted for their simultaneous action on all of the teeth. A well-fitting bite plane would interfere with the occlusal adjustment. In Class II, Division 2 cases vertical arch spurs are needed earlier in treatment and are used more frequently than in Class I, Division 1 cases.

Expansion: Although the Begg technique was originally conceived as a method for treating cases in which no expansion was required, it can be applied where expansion is considered advisable, especially in the lower arch (Fig. 14). All of the erupted teeth are banded and a diagnostic setup is made. When the arch wire is constructed, vertical loops are placed against each molar tube. If space between the canine and the molar is needed for a blocked-out premolar, vertical loops are constructed to rest against the distal edge of the canine bracket on the diagnostic setup. When the arch wire is constricted for insertion in the mouth, distal pressure is exerted against the molars and mesial (separating)



A. B.

Fig. 14.—Expansion cases. *A*, Use of vertical loops to create space between molar and canine for erupting second premolar. *B*, Use of vertical loops to create space for unerupted second premolars and to align anterior teeth.

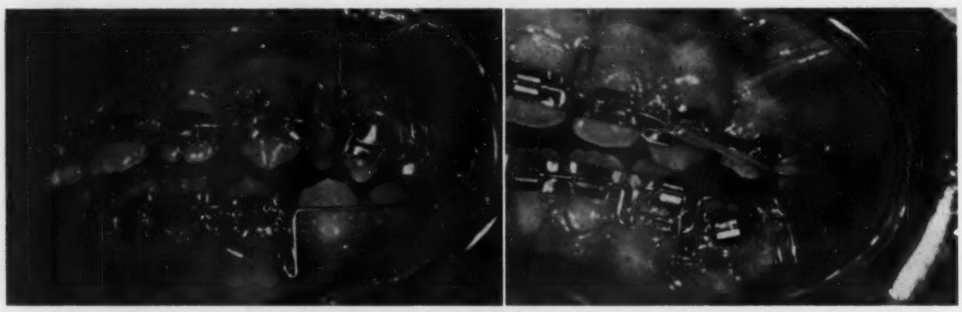
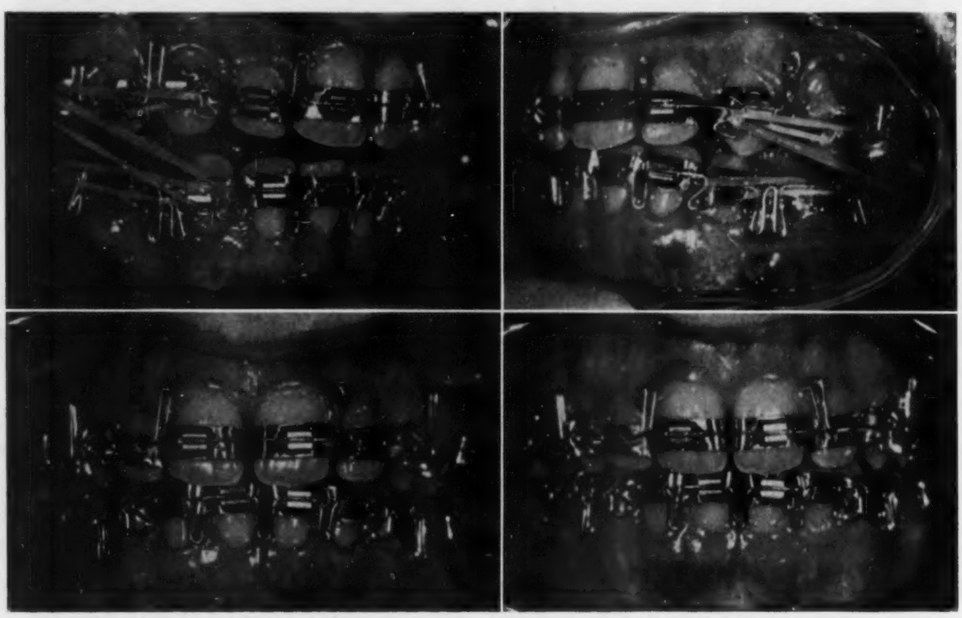
A.  B.

Fig. 15.—Atypical situations requiring specific types of loops. *A*, Without eyelets or rotational springs, the first premolar was rotated from a 90 degree position. *B*, The recurved loops will create space for the erupting second premolar; at the same time, the horizontal portion of the arch wire can be judiciously engaged.



A. A'.
B. B'.

Fig. 16.—Mid-line discrepancy and space closure. *A*, Class III elastics employed on the right side of the mouth to aid in adjusting for the midline discrepancy *(B)*. *A'*, Class II elastics employed on the left side of the mouth; intramaxillary and intramandibular elastics are also used. *B'*, Case ready for vertical arch spurs or a more simplified arch wire.

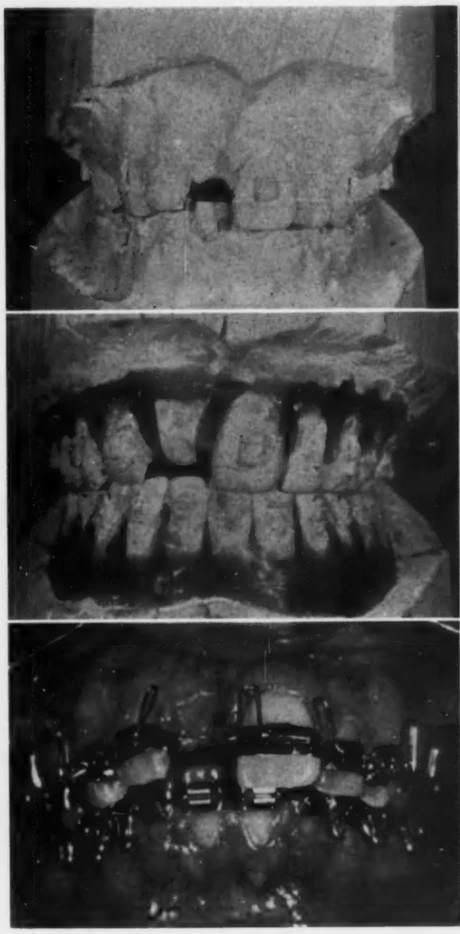
pressure is exerted against the canine and anterior teeth. Occlusal leveling will occur at the same time, especially if the premolars can be engaged. Class II elastics may have to be employed to maintain a Class I molar relationship.

Atypical Situations.—Since all malocclusions have individual characteristics, infinite variations are needed in the formation of loops and spurs over the diagnostic setup for each case (Fig. 15).

If the hooks for the elastics are built into the arch wire mesial to the canines in both arches, Class III elastics can be employed on one side and Class II elastics on the other side to aid in adjusting for midline discrepancies at the same time that space closure is occurring (Fig. 16).

If space after extraction must be maintained in one quadrant, the loops can be formed against the molar tube to maintain that space. In another quadrant the wire can be designed to allow space to close (Fig. 13*A*). When

A. *A.*



B. *B.*

C. *C.*

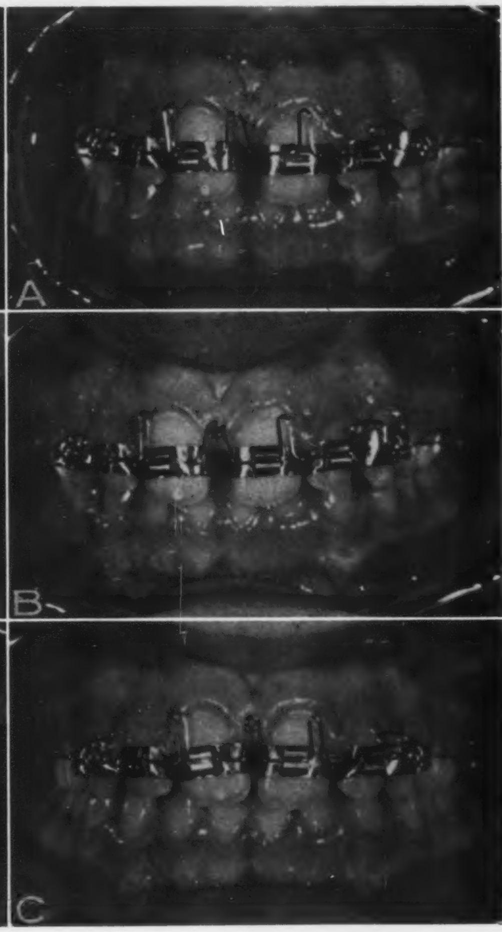


Fig. 17. Fig. 18.

Fig. 17.—Space maintenance. The vertical loops will recreate the space lost and then maintain it for eventual tooth replacement.

Fig. 18.—Space closure. *A,* Safety-pin loop before tying. *B,* Immediately after tying. *C,* Six weeks later; further root paralleling is, of course, necessary.

the entire arch wire is designed over the diagnostic setup, a symmetry is achieved to create this action (Fig. 13*B*). This symmetry is extremely difficult to produce in the mouth or on a work model with the teeth in malocclusion.

In extreme cross-bite conditions (where both molars and premolars on one side are inside the occlusion and a Class II relationship exists on the other side), a diagnostic setup with all of the bands in place is of immeasurable value in designing the arch wire to be used. Because of the lightness of the wires, overexpansion, overcontraction, and cross-elastics are employed.

This procedure can be used in cases of congenitally missing teeth or premature loss of teeth. The vertical loops are formed on the diagnostic setup. They are formed, however, in such a way as to aid in re-establishing or maintaining the space needed for eventual tooth replacement. This is done by placing the loops against the brackets of the teeth that are to be separated or kept apart (Fig. 17).

Conversely, vertical loops can be used to close space between teeth. This is accomplished by placing the loops distal to the brackets of the teeth to be closed and by also placing a loop between the teeth to be closed (Fig. 18).

SUMMARY

I have briefly reviewed Begg's light wire technique and described certain variations evolved in my use of the technique. Application of the variations to the management of specific orthodontic problems has been discussed.

This is a preliminary report. I have not treated a large enough number of cases over a period of years to be able to state my results categorically as clinical facts. Thus far (1959) I have treated 105 cases of various types of malocclusion by this method. The gratifying results that I have obtained have led me to concur with Begg's claims concerning the advantages of the technique:

1. The resilient light wires deliver optimum force for simultaneous tooth movement.
2. The vertical spurs and loops give adequate tooth control.
3. One thin round wire with a minimum of adjustment produces most of the required tooth movement.
4. Treatment time is reduced. Fewer appointments and less chair time are necessary for each patient.
5. The method causes little discomfort to the patient.
6. Because of the rapidity of action, there is reduced appliance breakage.

It would also appear that the previously outlined adaptations of the Begg mechanism have certain additional practical values to recommend their use:

1. Substituting the 0.10 inch double-width edgewise bracket for the ribbon arch bracket makes the technique compatible with edgewise procedures.
2. Continuing the vertical loops in the posterior section of the arch wire promotes better root control of the premolar teeth. There is less adverse bending of the light wire because of mastication or occlusal interference.

3. Forming the arch wire on a diagnostic setup with all of the brackets in place produces a sureness of design that is not otherwise easily attainable. The use of diagnostic setups before treatment has been advocated, but, to my knowledge, this particular setup has not been previously described. It appears to have a significant potentiality as a treatment adjunct, since it provides a predetermined objective upon which all necessary arch wires may be formed.

Since this is a preliminary report, numerous documented cases long out of retention have not been presented. In time, a more critical appraisal of the stability of results will be possible.

CONCLUSION

The material presented in this article is offered solely as a mechanical aid to the practicing orthodontist. As Salzmann[5] says, "The intelligent practice of orthodontics does not confine itself to the rule of thumb application of any one system, but employs various types of appliances according to their usefulness in specific cases and in keeping with the ability of the operator to obtain the best possible results." Each man will decide for himself how the technique may be applied to his concept of orthodontics.

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Medical Arts Bldg.

Editorial

TO AMEND DENTAL HYGIENIST BILL

THERE is more and more evidence of the popularity of the dental hygienist and of the modern team concept of dental practice. The idea of a dental health team, composed of the dentist, and such auxiliary personnel as the dental hygienist, the technician, and the dental assistant, is attracting more and more favorable attention.

Evidence of progress is revealed by the introduction in the California Legislature on Jan. 19, 1961, of a bill providing for extension of the dental hygienist's services to the public in that state. Both state dental associations in California are in full support of the bill, and their officers seem to be confident that it will pass.

If the bill does pass, hygienists will be permitted to administer topical treatment under the direction of any licensed dentist, public institution, or school authority. This will be another step forward in the movement to increase production of dental services under the direction of the dentist.

In this connection, the summary of the excellent and comprehensive report of the Commission on the Survey of Dentistry in the United States, recently published by the American Council on Education,* provides very interesting and informative reading for all dentists everywhere.

In discussing the subject of productivity in dental practice, the report projects the suggestion that one way to increase dental productivity is through the wider use of auxiliary personnel—dental assistants, hygienists, and technicians. In this connection, it is stated in the report that "there is no question that auxiliary dental help can markedly increase the capacity of a dental practice whether group or solo." The report adds that a recent study shows that the average dentist, aided by two assistants, can increase his work load by 67 per cent.

The report also goes on to say that the broadening of services performed by auxiliary personnel should start with dental hygienists. "Their education has been highly organized for some years, with some of the thirty-four hygienist schools requiring four years of work (although two years is the more usual). Hygienists must obtain a license to practice. All but one of the schools are accredited by the American Dental Associations Council on Dental Education, and from careful analysis of their curriculums, the commission is convinced that a hygienist is well enough grounded in basic dental science to permit a considerable expansion of her duties."

*Hollingshead, Byron S.: Dentistry in the United States—Status, Needs, and Recommendations, American Council on Education, Washington, D. C.

The report also has much to say in reference to dental assistants. However, the key point is in the fact that the American Dental Association, in conducting a certification program for individual assistants, found that "only 6,700 had certification and it is understandable that there is reluctance to allow assistants to take over treatment functions, however simple."

The commission recommends that:

1. Dentists utilize a greater number of well-trained dental assistants.
2. The number of schools for assistants be increased.
3. The dental profession conduct studies designed to develop and expand the duties of auxiliary personnel. The broadening of services should begin with the dental hygienists because there is already an approved program of education and licensure for this group. The legal and educational restrictions against male hygienists should be removed.
4. As soon as the dental profession standardizes the educational programs for dental laboratory technicians and for dental assistants, consideration be given to widening the duties of these auxiliary groups. In the public interest, the education of auxiliary personnel should be carried out under the guidance of the dental profession, and the services performed by all auxiliary personnel should be under the supervision of licensed dentists.
5. Dentists in all states be required by law to provide dental technicians with written prescriptions for the fabrication of dental appliances, and these regulations be strictly enforced.

Most state dental laws provide that treatment by the hygienist shall be confined to exposed surfaces of the teeth. The proposed California law providing for the inclusion of specific topical treatment under the direction of the dentist indicates the success of the hygienist movement as far as both the public and the dental profession are concerned. It may be that many state laws will now be changed to comply with the recommendations of the comprehensive study underwritten by the American Dental Association, the Kellog Foundation, the Council on Education, the Rockefeller Brothers Fund, and the Hill Family Foundation.

It would be physically impossible to carry out, even remotely, the far-ranging changes designed to bring adequate dental care within reach of all Americans as proposed by the Commission on the Survey of Dentistry in the United States, without first widening the duties of auxiliary dental personnel to relieve the dentist of some of the work load.

Other recommendations of the Commission include the graduating of at least 6,000 dentists annually by 1975 (double the present number) and the establishment of additional facilities for training auxiliary personnel.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York.

A History of Dentistry in Colorado, 1859-1959: By William A. Douglas, M.A. Boulder, Colo., 1959, Johnson Publishing Company. 277 pp. Price, $5.00.

This book is replete with intense reader interest, particularly for those who are fascinated by the progress and survivals in the pioneer history of dentistry and medicine in our United States.

There must exist some systematic procedure by which all reviewers (professional, expert, or otherwise) should remain within the limits which would be germane both to the authenticity of the material substance and to the style and presentation of the author.

This should be particularly true in historical or nonfiction authorships, though largely variable. Since no two or more authors personalize the established documentary material the same, whether as a participant or through the lengthening channels of research, it behooves the reviewer to operate in the third dimension and play a supporting role, fair, constructive, and without detractive prejudice or personal criticism.

The format of this book is perfectly arranged in chapter sequences. The following facts, from Appendix B, are noteworthy:

The Historical Research Committee of the Colorado State Dental Association secured the assistance of the University of Colorado's Department of History and, at their recommendation, selected William A. Douglas to write an authoritative history of the C.S.D.A.

Since Mr. Douglas graduated from the University of Colorado in 1958 with an M.A. in history, at age 30, it becomes all too obvious that the author, in addition to recourse to the archives and research, was accorded very substantial assistance by the Historical Research Committee composed of Henry F. Hoffman (Chairman), Robert A. Downs (Vice-Chairman), Charles A. Monroe, and William O. Brubaker.

This remarkable book records the history of dentistry in one of our great commonwealths from 1859 to 1959. The Centennial celebrated in 1959 was the "Rush to the Rockies" following the discovery of gold and silver near what is now Denver, in 1858, and the two are not to be confused. The present Colorado was originally the westward extension of the Territory of Kansas; it became the Provisional Territory of Jefferson in 1859, the Colorado Territory (U. S. Congress) in 1861, and the State of Colorado in 1876. The Colorado State Dental Association was founded in 1887.

There are eighteen state dental societies organized before 1870 which have been or will be celebrating their authentic Centennials, the oldest being Michigan (1856), Indiana (1858), and Georgia (1859).

From the viewpoint of a reviewer, the author's greatest gift is to be found in his understanding of the ranges and changes contemporary with the full century of progress, both professional and general, from 1859 to the immediate present, as well as the times and conditions under which it was produced.

This book is not an anthology but a pure and true factual history, not only of Colorado but reflecting perfectly the community of progress of all the states and sections through their similar pioneer evolutions which has formed their "composite" into our great and wonderful cultural America of today!

From the foreword, written by William R. Humphrey (affectionately known as Bill), President of the C.S.D.A., the preface and the eleven successive chapters into Appendix A and B are a remarkable compilation.

This reviewer is intimately familiar with the histories of the pioneers in dentistry throughout the Southeastern States from Virginia to Louisiana, and with their problems and achievements. One cannot help but feel by their heritage that this is America!

In contrast, however, with the Atlantic Seaboard States appears the aura of that ever-indomitable spirit of "Westward Ho," separated by distances and the many handicaps of pressing forward the pioneer frontiers into the great West which forms our boundaries from the Atlantic to the Pacific.

The discovery of gold (and silver) in 1858 in Cherry Creek near Denver, and later in Gregory Gulch west of Denver, marked the second great American "gold rush" following 1849. In less than a year, approximately 3,000 prospectors had arrived; thus, the history of Colorado, including dentistry, began to grow in 1859. Among these pioneers were many physicians and surgeons and dentists in quest of "health" and fortunes in gold, perhaps more adhesive than cohesive to them!

They brought their families and equipment, including dental chairs and engines, along in the long trails of slow-moving prairie schooners in order to hold onto their "bread line." These pioneers were essential to the community "where they may at all times be found professionally, when not engaged in digging gold."

Without discounting in the least the contributions of the dentists and dentistry in the State of Colorado in organization, education, ethics and laws, public health, institutional and industrial, so clearly delineated in this book, it is also evident that their highest standards, accomplished tirelessly, can be pointed to with pride throughout all of the professional world!

Perhaps the greatest highlights to orthodontists and readers of the AMERICAN JOURNAL OF ORTHODONTICS are Chapter 9, entitled "From Colorado Brown Stain to Fluoridation," and Appendix A entitled "Specialization."

Chapter 9 is devoted exclusively to the amazing record of Dr. Frederick S. McKay, 1900 graduate of the University of Pennsylvania Dental School and 1903 graduate of the Edward H. Angle School of Orthodontia. At the head of this chapter is the following convincing quote:

> Fluoridation may be cited as the ideal example of the direct benefits of research to the public.
>
> —*Joseph V. Kirby.*

It was in Colorado Springs, an outstanding health center, that Dr. McKay discovered the prevalence of "brown stain" or "mottled enamel," a moot problem in dentistry which he so persistently and intensively sought to solve. Dr. McKay's investigations, largely by the process of elimination, eventually led to drinking water and the presence of variable mineral contents, later due to be analyzed from water emanating from certain geological strata in those mountainous sections.

As fluoridation has become integrated into dentistry and public health, Dr. McKay's contributions have become history and made him immortal. The true story in this chapter alone is priceless and should be known and cherished by every dentist!

Appendix A, under "Specializations," includes much of the history of the many fundamental contributions of Dr. Albert H. Ketcham. Dr. Ketcham graduated from Boston Dental School in 1892 and the Edward H. Angle School of Orthodontia in 1902. Dr. Ketcham was the first Colorado dentist to establish himself formally as an orthodontist and specialist in Denver. Dr. Ketcham's contributions are too legion to include here; suffice it to mention his greatest and last, the Albert H. Ketcham Memorial Award, established in 1936 by the American Board of Orthodontics in collaboration with the American Association of Orthodontics—the highest award for achievement within their power to grant!

Thus, two of the noble sons of Colorado engraved brilliant records across the pages of American dentistry and their service to mankind!

Both Dr. Ketcham's and Dr. McKay's "Orthodontic Profiles" were published in the AMERICAN JOURNAL OF ORTHODONTICS as follows:

Albert H. Ketcham, by George H. Siersma, p. 792, AM. J. ORTHODONTICS, October, 1958.

Frederick Sumner McKay, by Robert Downs, p. 695, AM. J. ORTHODONTICS, October, 1959.

The *History of Dentistry in Colorado, 1859-1959* is of universal value and intensely interesting to read, especially to those who revere our history and the fact that

"The things we do for others live on and become immortal."

The author, William A. Douglas, has written a masterly record from a great wealth of material. The book is replete with many interesting illustrations.

A great deal of credit is due the Historical Research Committee and its Chairman, Henry F. Hoffman. This review would be anticlimax and incomplete without a fitting tribute to all the pioneers and all the men and women who in reality made the history of American dentistry in Colorado.

From this reviewer's "hilltop," it is strongly recommended that everyone sufficiently interested should procure a copy of this enchanting book from the Johnson Publishing Company, Boulder, Colorado.

Joseph D. Eby.

News and Notes

American Association of Orthodontists

The following committees have been working to make a success of this year's meeting of the American Association of Orthodontists, which will be held April 16 to 21, 1961, in Denver, Colorado:

1961 Session

J. Lyndon Carman, General Chairman
501 Republic Bldg., Denver, Colorado
Henry Hoffman, Honorary Chairman
Mercantile Bank Bldg., Boulder, Colorado

Program Committee

J. A. Salzmann, Chairman
654 Madison Avenue, New York, New York
William S. Brandhorst, Chairman—Table Clinics
Robert M. Ricketts, Co-Chairman—Table Clinics
Boyd W. Tarpley, Chairman—Round-Table Discussions
Faustin N. Weber, Chairman—Registered Clinics
Robert E. Moyers, Co-Chairman—Registered Clinics
William L. Wilson, Chairman—Thursday Morning Session
Wendell L. Wylie, Chairman—Tuesday Morning Session

Local Arrangements Committee

George H. Siersma, Chairman
1232 Republic Bldg., Denver, Colorado
H. C. Pollock, Co-Chairman
925 So. Colorado Blvd., Denver, Colorado
Oliver H. Devitt, Treasurer
523 Republic Bldg., Denver, Colorado
Curtis Burson, Assistant Treasurer

Walter Appel
Hubert J. Bell
Richard Harshman
Charles Hasstedt
Reed A. Holdaway
Kenneth R. Johnson
Elbert W. King
Eli H. Mullinax
Harold E. Rice

Credentials Committee

George E. Ewan, Chairman
Bank of Commerce Bldg., Sheridan, Wyoming
Raymond M. Curtner
Daniel E. Shehan

Commercial Exhibits Committee

Irving Grenadier, Chairman
23 Sherman Ave., Mt. Vernon, New York
Don V. Benkendorf, Co-Chairman
932 Metropolitan Bldg., Denver, Colorado

Curtis L. Benight
William C. Crockatt
LeGrand R. Curtis
Thomas W. Fellows
Albert L. Miller
Tobias Weissman

Registration Committee

L. J. Williams, Chairman
843 So. Center, Casper, Wyoming

William A. Blueher
Curtis E. Burson
Phillip Cohen
Randle J. Gardner
Ignacio R. Quijada

Properties Committee

William C. Jackson, Chairman
1232 Republic Bldg., Denver, Colorado
Robert Splain, Co-Chairman
5700 Connecticut Ave., N. W., Washington, D. C.

William Benight
Robert Blenkner
Daryl Burns
Thomas Gardner
Edwin M. Hagihara
George C. Moore—TV
Deryl Swanbom
Donald J. Ullstrom
Fred Wutherich

Banquet and Entertainment Committee

George H. Siersma, Chairman
1232 Republic Bldg., Denver, Colorado

Aldo Battiste
Curtis E. Burson
B. J. Callan
Rex Greenwood
Ernest T. Klein
Louis J. Williams
Howard Wilson

Press Committee

Howard L. Wilson, Chairman
1107 Republic Bldg., Denver 2, Colorado

Frederick R. Aldrich
William R. Alstadt
Allan G. Brodie
Herbert K. Cooper
Bernard DeVries
G. Vernon Fisk
Nathan Gaston
T. M. Graber
George S. Harris
Harold J. Noyes
H. C. Pollock
Robert H. W. Strang

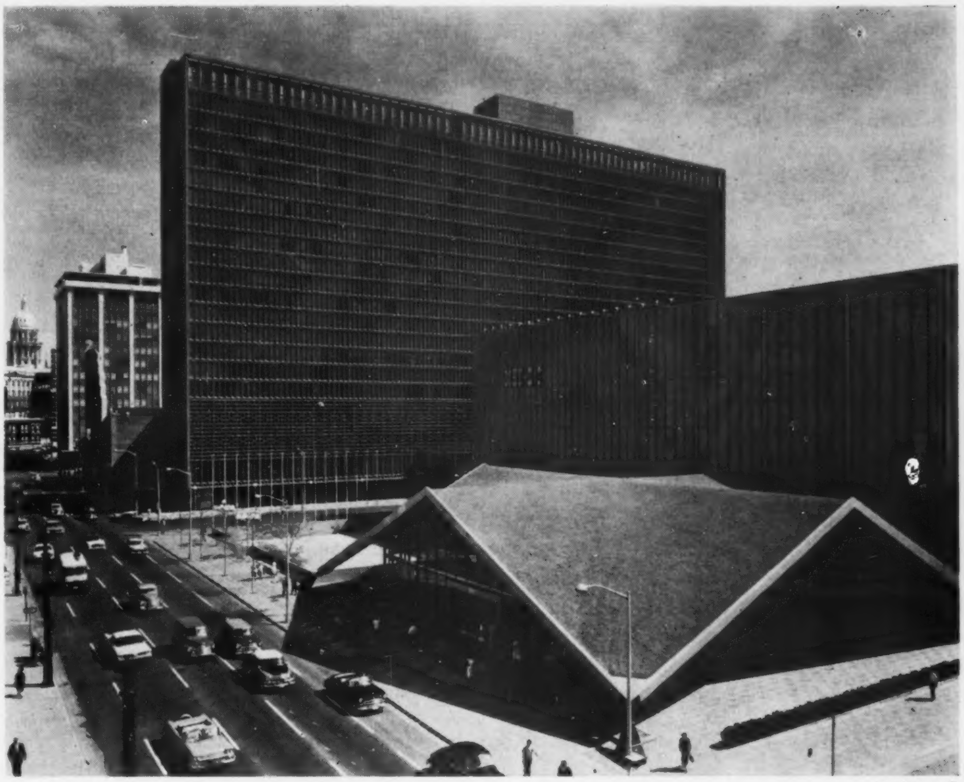
Hospitality, Information, and Tours Committee

H. C. Pollock, Jr., Chairman
925 So. Colorado Blvd., Denver, Colorado

Wynn Anderson
Adolf Brown
Marion L. Kercheval
Louis S. Miller
Wayne L. Peay
Jack A. Rampton
Elmer L. Sandberg
Chet L. Snyder
Ellis Van Dyke

Ladies' Entertainment Committee

Robert S. Freeman, Chairman
3705 E. Colfax Ave., Denver, Colorado
Mrs. J. Lyndon Carman, Co-Chairman
501 Republic Bldg., Denver, Colorado



O. Roach

The beautiful and impressive new twenty-two-story Denver Hilton Hotel, headquarters for the fifty-seventh annual meeting of the American Association of Orthodontists, which will be held in Denver, Colorado, April 16 to 21, 1961. The new May D & F is in the foreground of the above photograph, and down the street the gleaming dome of the capitol building can also be seen. (Photograph courtesy of Colorado Visitors Bureau.)

Registered Clinics Committee

Faustin N. Weber, Chairman
Robert E. Moyers, Co-Chairman

Elmer F. Bay
Aldo A. Battiste
Hubert J. Bell
William A. Blueher
B. J. Callan
LeGrand R. Curtis
Randle J. Gardner
Richard E. Harshman
Charles W. Hasstedt
Reed A. Holdaway
Elbert W. King
J. Alden Langenfeld
Cecil G. Muller
Eli H. Mullinax
J. W. Norris
John H. Rogers
Leo A. Rogers
William B. Stevenson, Jr.
Harold K. Terry
David J. Thompson
Everett A. Tisdale
Louis J. Williams
Tom M. Williams
Howard L. Wilson
Howard Yost

Round-Table Discussion Committee

Boyd W. Tarpley, Chairman

Earl C. Bean	William H. Oliver
Edward A. Cheney	Russell Winston
Frank F. Lamons	Eugene E. West

Pacific Coast Society of Orthodontists*

Your own component society will not have its usual meeting at this time of the year so plan to attend the 1961 meeting and spend a few days in this beautiful part of the country.

President Pete Bishop and Publicity Chairman Jim Keenan send along their greetings and invitations to attend the 1961 P.C.S.O. meeting in Seattle, August 6 to 10.

P.C.S.O. MEETING—AUG. 6 TO 10, 1961

It doesn't seem possible that the meeting of the P.C.S.O. to be held in Seattle is only six months away, but that is a fact. I have just returned from a dinner meeting with the chairmen of every committee on local arrangements, with Bob DeButts as the general chairman. Bob is a hard worker and even at this early date, has his committeemen reporting excellent progress. George McCulloch has a good program planned that will be of interest to everyone. More of this later. *Allen Bishop.*

We are doing our best for the scientific session by avoiding any earth-shaking magic pills and concentrating on fundamentals. We believe that the thoughts you take home with you to keep the longest may not be spectacular, but you can be sure they are the results of careful, sound thinking on the part of our chosen clinicians.

Mark the date in your book now—Seattle P.C.S.O. meeting, Aug. 6 to 10, 1961.

Jim Keenan.

NORTHERN COMPONENT

Dr. Robert Harrington has accepted our invitation to appear before us on Feb. 27, 1961, at the Benjamin Franklin Hotel in Seattle. He is a specialist in voice and speech disorders and has taken a great interest in the problems of muscle habits, speech, and related disorders as they are associated with orthodontic problems. We feel very fortunate in being able to obtain a man of Dr. Harrington's caliber, and those who have heard him previously are very enthusiastic about his presentation to orthodontic groups, feeling that he has a great deal to offer. The program will be starting promptly at 9 A.M. Dr. Harrington will take the full morning period. In the afternoon he will probably enlarge on etiology and diagnosis and the treatment of tongue habits and abnormal swallowing habits. Following this we are planning a panel discussion with Dr. Harrington, Dr. John Palmer, and Mrs. James Carrel, the latter two of Seattle, and it is hoped we may be able to have time for a question-and-answer period after the panel discussion. Sunday evening, the 26th, there will be an informal get-together at the Benjamin Franklin, followed by a dinner for those members and their wives who can be in attendance.

CENTRAL COMPONENT

The final meeting of the year was held at the Fairmont Hotel on Dec. 13, 1960. The record attendance, accounting for some 70 per cent, of the total membership, was clear testimony of the membership's favorable reaction to the excellent meetings that have been planned during the year by Program Chairman Don Priewe. Our thanks go to Harley Odden who provided lapel name tags, a welcome addition.

*Excerpts from the *Bulletin* of the Pacific Coast Society of Orthodontists, January-February-March, 1961.

The meeting was called to order shortly after 9 o'clock by Chairman John Parker. Program Chairman Don Priewe then introduced Dr. Harold A. Eskew, of Silver Springs, Maryland, who spoke on "Group Practice Organization—a Personal and Public Responsibility." Introductory to his presentation, Dr. Eskew related the trials and tribulations of a snowbound traveler trying to make a scheduled meeting. By virtue of great persistence and perseverance, and after several false starts, Dr. Eskew was able to leave the ice-clad East and, by means of a roundabout tour, arrive in San Francisco. With the assistance of slides, Dr. Eskew very ably presented an indirect technique which covered all the phases from separation through impressions, making of dies, band formation, and cementation. Dr. Eskew then read his paper entitled "Let Us Look at Ourselves." In this he well described the challenges that face the profession of orthodontics and ably described some possible solutions.

SOUTHERN COMPONENT

The general assembly meeting at the Statler Hilton Hotel in Los Angeles was called to order by President Lee at 9:35 A.M. on Friday, Dec. 2, 1960. The minutes were accepted as published. Dr. Sydney Meek, treasurer, called the Society's attention to the new method of paying dues: All billing will be from the central office of the constituent and the return checks will be mailed to the constituent treasurer, and not to the component.

The secretary read the change in the A.D.A. Principles of Ethics Section 18, passed by the A.D.A. House of Delegates in Los Angeles, California, on Oct. 18, 1960.

Lloyd Cottingham, membership chairman, announced that there are twelve active and nineteen associate members accepted for this year. The mail ballot gave approval to these men, who became members of this component as of this date.

Denver Summer Meeting for the Advancement of Orthodontic Practice and Research, Inc.

The twenty-fourth annual Denver Summer Meeting will be held July 30 to Aug. 4, 1961, at Writer's Manor in Denver, Colorado. The following outstanding program has been arranged by the Board of Trustees:

Maury Massler, D.D.S., M.S.

1. Oral Habits: Origin, Evolution, and Management
   - A. Sucking Habits
   - B. Biting Habits
   - C. Tongue and Lip Habits
2. The Adolescent Looks at Orthodontia
3. Radiographic Interpretations of Bone Changes Incident to Tooth Movement
   - A. Changes in the Lamina Dura
   - B. Estimating the Resorption Potential of Bone and Root

Robert M. Ricketts, D.D.S.

Cephalometrics

Harry W. Tepper, D.D.S.

Dynamic Functional Therapy—The Orthodentor by Bimler
- A. Philosophy of Functional Therapy
- B. Mode of Action
- C. Advantages for Orthodontist and Patient

Joseph A. Fitzpatrick, Ph.D., and David Stone, B.S., D.D.S.

1. Adverse Swallowing, a Pattern of Tongue Thrusting Related to Dental Malformation
2. Causes, Recognition, and a Treatment Using the Speech Therapist to Restore the Muscles and Patterns in Swallowing

Federal Aid for Dental Students and Schools Urged by President*

President John F. Kennedy unveiled his comprehensive program for federal health action Feb. 10 in a message to Congress. The total cost would be approximately $1.2 billion. Among its other provisions, the plan calls for substantial aid to dental schools and dental students. In his request, Mr. Kennedy allied himself with the long-held ADA position that many more dentists and expansion of dental school facilities are needed to keep pace with population growth and increased demand.

As expected the message also included provisions for old age medical care under the social security system. Cost of the care would be met by an increase of one-half of one per cent in social security deductions, split between employer and employee, effective Jan. 1, 1963. Until that time, the program will be financed by raising the amount of taxable income from $4,800 to $5,000, amounting to $6 a year for all earning more than $5,000. In offering the plan, the Chief Executive stated that it was ''not socialized medicine. It is a program of prepayment of health costs with absolute freedom of choice guaranteed. Every person will choose his own doctor and hospital.''

In the dental aid aspects of the program, Mr. Kennedy recommends allocating $75 million a year for constructing, improving and expanding dental and medical schools. He also urges granting scholarships of $1,500 for one-fourth of all new dental and medical students, plus $1,000 direct to the schools for each scholarship awarded. The schools can use the money to pay four-year scholarships, based on need, of up to $2,000 a year per student. Cost of the program for the first year is estimated to be $5.1 million, mounting to $21 million by 1966.

The President's medical care for the aged plan would provide: 1) hospital care for 90 days for one illness. The patient would pay the first $10 a day for nine days, then receive care without cost for 81 days; 2) up to 180 days of nursing care at home after hospital discharge plus limited nursing service at other times, and 3) payment of outpatient diagnostic fees over $20. The cost would be about $1.1 billion.

Other proposals in the President's Congressional message include creation of a national institute of child health and human development and a starting grant of $10 million to improve nursing homes and home-nursing services.

International Dental Congress

Dentists who expect to attend the International Dental Congress will be interested in learning that word has been received concerning the Congress, which will be held in Cologne, Germany, July 7 to 14, 1962, by Fédération Dentaire Internationale. Since the Congress will be in the middle of the summer, it is highly important that plans be made as far in advance as possible. Information may be obtained by writing Dr. Obed H. Moen, president of the organization and treasurer of the U.S.A. Section, at 6 Main St. Watertown, Wisconsin. Information concerning special tours may be obtained from Dr. C. W. Carrick, Travel Consultant for the U.S.A. Section, 5 South Main St., Oberlin, Ohio, or from any American Express office or reputable travel agency.

Dr. Steiner made an Honorary Member of Argentinian Society

The Sociedad Argentina de Ortodoncia, at its meeting on Nov. 22, 1960, named Dr. Cecil C. Steiner an honorary member in recognition of the valuable teaching that he has done on various occasions for the members of that institution.

*From the ADA *Newsletter*, Feb. 15, 1961.

Death of Leonard P. Wahl

We regret to announce that Leonard P. Wahl, orthodontist of Wausau, Wisconsin, died on Feb. 23, 1961.

European Cleft Palate Authority to Lecture in the United States

Dr. Rudolf K. Stellmach of the Department of Maxillo-Facial and Plastic Surgery of the Medical Academy in Düsseldorf, Germany, will be in the United States on an extended lecture tour. His subject is ''The Orthodontic Management of Infants With Cleft Palates.'' He will also discuss the surgical procedures used in treating infants with bilateral cleft palates. The itinerary of Dr. Stellmach's lecture tour is as follows:

Boston, Massachusetts	April 28, 1961	Tufts University
(This is the annual Margolis Lecture)		Boston University
Chicago, Illinois	May 5, 1961	University of Illinois
Seattle, Washington	May 12, 1961	University of Washington
Houston, Texas	May 26, 1961	University of Texas
Memphis, Tennessee	June 2, 1961	University of Tennessee
New York City, N. Y.	June 9, 1961	New York University

Those interested in attending the lectures will kindly contact the host institutions.

Lenox Hill Hospital

The next meeting of the orthodontic staff of the Lenox Hill Hospital in New York City will be held at 8:15 P.M. on Thursday, April 13, 1961, in the Doctor's Lecture Hall. Dr. Howard Dimond of New Brunswick, New Jersey, will discuss ''Efficient Orthodontic Practice Management.''

Notes of Interest

William S. Cabell, D.D.S., announces the opening of his office at 510 Wainwright Bldg., Norfolk, Virginia, practice limited to orthodontics.

William A. Giblin, B.S., D.D.S., announces the association of John R. McGeown, B.S., D.M.D., in the practice of orthodontics at 85 Park St., Montclair, New Jersey.

Adeline S. Guttelman, A.B., D.D.S., announces the removal of her office to 11 Fifth Ave., New York, New York, practice limited to orthodontics.

H. Curtis Hester, D.D.S., announces the removal of his office to 203 Bellevue Ave., Upper Montclair, New Jersey, practice limited to orthodontics.

Irvin M. Kamenir, D.D.S., announces the opening of his office at Highland Square Medical Bldg., 777 West Market St., Akron 3, Ohio, practice limited to orthodontics.

Forthcoming meetings of the American Association of Orthodontists:

1961—Denver Hilton Hotel, Denver, Colorado, April 16 to 21.
1962—Statler Hotel, Los Angeles, California, April 28 to May 3.
1963—Hotel Fontainebleau, Miami Beach, Florida, May 5 to 9.
1964—Palmer House, Chicago, Illinois, May 10 to 14.
1965—Dallas Statler-Hilton, Dallas, Texas, April 25 to 30.

OFFICERS OF ORTHODONTIC SOCIETIES*

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and its component societies. The Editorial Board of the JOURNAL is composed of a representative of each of the component societies.

American Association of Orthodontists
(Next meeting April 16-21, 1961, Denver)

President, William R. Humphrey - - - - - - - - - Republic Bldg., Denver, Colo.
President-Elect, Dallas R. McCauley - - - - - - 410 S. Beverly Dr., Beverly Hills, Calif.
Vice-President, Cecil G. Muller - - - - - - - - 101 S. 35th Ave., Omaha, Neb.
Secretary-Treasurer, Earl E. Shepard - - - - - - - 225 South Meramec, Clayton, Mo.

Central Section of the American Association of Orthodontists
(Next meeting Oct. 1-3, 1961, Minneapolis)

President, Henry E. Colby - - - - - - - 1850 Medical Arts Bldg., Minneapolis, Minn.
Secretary-Treasurer, Kenneth E. Holland - - - - - - 1016 Sharp Bldg., Lincoln, Neb.
Director, G. Hewett Williams - - - - - - - - - - - - 811 Elm St., Winnetka, Ill

Great Lakes Society of Orthodontists
(Next meeting Nov. 12-17, 1961, Miami Beach)

President, Paul V. Ponitz - - - - - - - 914 Security Bank Bldg., Battle Creek, Mich.
Secretary, Edward A. Cheney - - - - - - - - - - 2900 Grand River, Lansing, Mich.
Director, Harlow L. Shehan - - - - - - 601 Jackson City Bank Bldg., Jackson, Mich.

Middle Atlantic Society of Orthodontists
(Next meeting Oct. 1-3, 1961, Atlantic City)

President, Paul V. Reid - - - - - - - - - - - Medical Arts Bldg., Philadelphia, Pa.
Secretary-Treasurer, Charles S. Jonas - - - - - - Mayfair Apts., Atlantic City, N. J.
Director, Louis E. Yerkes - - - - - - - - - - - - 825 Linden Ave., Allentown, Pa.

Northeastern Society of Orthodontists

President, Henry C. Beebe - - - - - - - - - - 60 Charlesgate West, Boston, Mass.
Secretary-Treasurer, David Mossberg - - - - - - 36 Central Park S., New York, N. Y.
Director, Norman J. Hillyer - - - - - - - - - 230 Hilton Ave., Hempstead, L. I., N. Y.

Pacific Coast Society of Orthodontists
(Next meeting Aug. 6-10, 1961, Seattle)

President, E. Allen Bishop - - - - - - - - - - - - 703 Cobb Bldg., Seattle, Wash.
Secretary-Treasurer, Warren A. Kitchen - - - - - 2037 Irving St., San Francisco, Calif.
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INDEX TO ADVERTISERS

A.A.O. Meeting
Rocky Mountain Metal Products — 24

Aderer Gold Wires
Julius Aderer, Inc. — 25

Asher Face Bows
Pages, Inc. — 12, 13

Baker Orthodontic Gold Solders
Engelhard Industries, Inc. — 1

Cephalometrics
B. F. Wehmer Co. — 6

CephalometriX
Moss X-ray and Medical Equipment Co. — 9

Chrome Alloy Orthodontics
Rocky Mountain Metal Products — 34

Chromex
Gilbert W. Thrombley, Inc. — 20

Dental Books and Journals
Leo L. Bruder — 29

DS Two-Piece Rubber Tooth Positioner
Dent-Spec Laboratories, Inc. — 31

Edgewise Brackets
The S. S. White Dental Manufacturing Co. — Fourth Cover

Electric Soldering
Rocky Mountain Metal Products — 33

Extraoral Traction Appliances
Orthoband Company, Inc. — 4

Face Bows
Orthodontic Supply Corp. and Research Inc. — 21

Indirect Banding
Dental Corporation of America — 5

Masel Stainless Steel Crowns
Isaac Masel Co. — 11

Orthodontic Brushes
Bi-Po Company — 8

Orthodontic Classified Advertisements 28

Orthodontic Services
Barnet Jaffe, Technician — 16

Orthodontic Services
TP Laboratories — 7

Orthodontist's Service
Betta Orthodontic Supplies — 3

Parkell Expansion Screws
Parkell Company — 18

Parkell Pliers
Parkell Company — 19

Pentids
E. R. Squibb & Sons — 31

Preformed Chrome Alloy Bands
Rocky Mountain Metal Products — 23

S-C Cement
Stratford-Cookson Company — 29

Steiner Headgear
Olympic Laboratories — 27

Steiner Spring Wing
Unitek — 14, 15

Study Models
The Cettel Studios — 27

Ultracleaner "61"
Williams Gold Refining Co., Inc. — 17

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